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THE SURGEON IN INDUSTRY*

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The development of pure medicine as opposed to surgery in the realm of industry has been in the practice of the science of prevention. It has not been part of the industrial medical officer's work to undertake the alleviation or cure of those ills that are manifest in the personnel. By keeping a careful watch on his wards' health he is able to recognize the first signs of disease. The sufferer is referred to his doctor or to hospital for treatment, whilst the industrial medical officer concentrates on his task of preventing a recurrence of the disease in the establishment, not necessarily in the patient. When the industrial medical officer has dealt with surgical matters it has generally been in developing the technique of first aid for minor or major injuries.

In the last few years, particularly since 1939, a wider range of treatment has been given for injuries and a closer connexion established between the industrial medical officer and the hospital orthopaedic departments—so much so, indeed, that in a few special industries treatment begun in hospital has been continued in the factory by the industrial medical officer under the supervision of the orthopaedic surgeon.

But the general surgeon and other specialists have remained almost wholly out of touch with industry: this raises the query whether or not the time has come when there should be a place in the hierarchy of specialists for the consulting industrial surgeon. Before attempting to answer this question I would stress as emphatically as I possibly can that the meeting-places of industry and surgery are not confined to the realm of traumatology. Whatever the disease condition—whether cancer, colic, or carbuncle—its aetiology and treatment are profoundly influenced by industrial circumstances.

General surgery must be awakened not only to its responsibilities to industry but to the immensity and variety of the opportunities for research and development which it is neglecting. In renewing his contact with industry the surgeon has much to learn and much to teach, and industry and surgery in collaboration have much to contribute to the health and happiness of the nation. In one brief lecture I cannot fully develop the theme—to learn, to teach, to help—and after mentioning certain principles I will try to make my meaning clear by a few examples.

In a Hunterian Lecture entitled "The Treatment of the Injured Workman" I offered the suggestion that, "whereas the criterion of recovery is restoration of working capacity, the goal of treatment is power"—power of performance and power of endurance. In setting himself this goal the surgeon must therefore have a very clear idea of what constitutes capacity for work; what in his patient is the cause of incapacity; how he can set about the restoration of capacity; and how recurrence is to be prevented. These questions can be answered only after a careful study of industrial conditions and by closest collaboration with industry's personnel.

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Prolapsed Intervertebral Disk

One of the greatest disasters that have befallen harassed industry in these latter years has been the unprecedented prolapse of countless intervertebral disks. Once upon a time men strained the muscles in their backs or, catching cold, developed lumbago, and after a few days in bed with loins well rubbed by a dutiful wife returned to work rather ashamed than otherwise of their human frailty. But now every pain in the back is an interesting case fraught with grave risk—to be belt-buckled, plaster-padded, or, glory of glories, explored.

When the surgeon and patient alike have become exhausted by months and months of modern orthodox treatment each and every one of these "backs" is warned of the fearful consequences of muscular effort. Against this particular evil he is given a magic charm—a "certificate for light work." If the compounder of this charm were interrogated he would probably reveal that all he knew of heavy work was that it was something calculated to cause grievous bodily harm and therefore only to be taken in very small doses.

In this subject, as in so many others, it is apparent that clinical medicine is out of sympathy with industrial requirements and accomplishes little in bridging the gulf between the labour manager with his insoluble problems of placement and the disk-contented surgeon with no problem of placement. It is for this reason that I have chosen the subject of the fashionable and errant nucleus pulposus as my illustration. I do not propose to dwell on methods of diagnosis or treatment, but only to examine the possibilities of bridging the gulf.

The span of this bridge must be erected on two foundations—on the one side of the gulf "Why?" on the other side "How?" The surgeon, with the help of his industrial colleagues, must determine why the injury occurred; and industry, helped by the surgeon, must determine how it is to be avoided.

Why the Injury Occurred

In those cases of prolapsed intervertebral disk in which working conditions may fairly be stated to have played a part it will generally be accepted that the precipitating cause of the prolapse was injury. An investigation of a number of cases in which I have felt that the diagnosis was established and in which trauma was a factor has convinced me that the prolapse has occurred when the back was bent and the sufferer was making a voluntary effort to straighten it against resistance. The resistance is nearly always applied indirectly through the arms and is manifest in an attempt to lift. Herein lies the essential difference between the mechanics of the fractured vertebral body and

the prolapsed intervertebral disk. In each the critical position is one of flexion of the spine; but the fracture of the vertebral body is produced by forced overflexion, and the prolapse of the intervertebral disk by extension and rotation against resistance. The injury occurs in both at the site of the maximum movement during the maximum pressure. In a typical example, a man is standing in a slightly stooping position when a heavy weight falls on his shoulders, forcing him forwards, overflexing the spine, and causing a crush fracture of the first lumbar vertebra; or, alternatively, the weight misses the man and he stoops, inclining slightly to one side, grasps the weight with both hands and strains to lift it, thus extending and rotating the back, and suffers prolapse of the disk between the fifth lumbar vertebra and the sacrum.

At once it is apparent that the commonest sites for the bone and disk lesions are at opposite ends of the lumbar spine. There is an equally obvious difference in the method of their production. The force producing the bone injury takes the patient by surprise; in the disk injury the force is deliberately produced by voluntary muscular effort.

In those rare instances of fracture of the body of a lumbar vertebra in which the force is applied relatively slowly, as when a man is standing with his back to a stack of bales which collapses, gradually forcing him downwards, the injury is found most frequently in the fourth lumbar vertebra. In this case the man has just had time to brace himself to resist the force before overflexion of the spine has occurred. From this example it will be seen that the lower part of the lumbar spine is vulnerable to both flexion and extension strains when the victim is aware of the traumatizing force, and the upper part of the lumbar spine is vulnerable when he is taken unawares.

If a healthy individual is asked to bend and touch his toes and recover to the erect position, he will be found to maintain regular breathing, probably exhaling during bending and inhaling on straightening the back. But when a man is asked to raise a heavy weight he bends freely but rises against the resistance of the lifted weight. In these circumstances the man usually exhales bending; then there is a preliminary intake of breath, the breath is held at the initiation of the lift, and is released after inertia has been overcome and the movement of extension of the spine has begun.

When the body is braced for a big effort, as lifting a heavy weight, the shoulder girdle is fixed by the external respiratory muscles and the breath is held. The diaphragm is firmly fixed, and this is possible only when the bony attachments of its crura are stationary. The first three lumbar vertebrae are therefore held immobile and movement of the lower back, whether of forced flexion or of voluntary extension, occurs first in the lower lumbar region.

The man who was slowly forced to his knees by the collapsing stack of bales braced himself to resist the overwhelming weight, and, although he succeeded in fixing and therefore preventing overflexion of the first three lumbar vertebrae, suffered fracture of the relatively movable fourth. In the case of the man who attempted to lift the weight, the first three lumbar vertebrae were also held immobile at the initiation of the lifting strain, and the movement of extension occurred between the sacrum and the fourth lumbar vertebra, thus causing maximum pressure on the lowest two disks in the lumbar series.

The mechanism of production of the prolapsed disk as I understand it may be summarized in four stages: (1) Positioning: flexion of the whole lumbar spine with the separation of the posterior contiguous margins of the neighbouring vertebrae. (2) Preparation: fixation of the upper three lumbar vertebrae in flexion. (3) Overcoming inertia: direct pressure on the lower disks, causing them to bulge slightly beyond the posterior margins of the vertebral bodies. (4) Raising: extension and rotation of the fourth and fifth lumbar vertebral bodies, causing the posterior margin of the bone to nip the bulging disk in a grinding movement with maximum pressure exerted to one side of the midline according to whether the man is inclined to the right or to the left.

It is often very difficult to obtain from a patient a coherent account of the mechanics of his injury. In many cases the workman has "thought back," and his account is no more than an imagination piece. It is essential, therefore, that investigation shall be carried out on the spot and not from the hospital notes. In these notes it is often recorded that the patient strained his back while lifting but never that at the initiation of the movement of lift the spine was in the position not only of flexion but also of slight rotation and lateral flexion, and that in rising the spine was therefore brought back to the straight position by a corkscrew motion.

How to Avoid the Injury

Obviously this leads to the conclusion that there is one particular type of strain that produces the prolapse of an intervertebral disk and, conversely, that it is nonsense to suggest that all heavy work places the nucleus pulposus in jeopardy.

Can the dangerous strain be eliminated or circumvented? Industry already has something to offer by way of solution. When the nature of the work renders back strain particularly prevalent methods have been adopted by custom which have been found to minimize the risks. One of the best examples is that of the coal-miner lifting a tub. The inexperienced man would risk straining his back each time he attempted its performance. Imagine him facing the tub, stooping with back well bent, putting his hands beneath the chassis, straining to lift, and inviting a disk injury. Generations of miners have learned to avoid this risk by the simple expedient of turning the back to the tub and lifting with the hands behind them. In this position the knees can be well flexed. The lumbar spine is held immobile until the actual lift has been initiated by the thigh muscles, and it is only when all the lumbar spine is mobilized by the release of the respiratory muscles that the back is somewhat straightened.

Individuals occasionally learn tricks which afford them some protection from recurrence of their symptoms. A mine-worker (a pan-turner) found that he could avoid pain if all his lifts were made in two stages: he would lift a short distance and then, after a moment's pause, complete the lift. After watching him at this manœuvre I was able to satisfy myself that the initiation of the lift movement was produced solely at the hip and knee with a completely fixed spinal column and with the breath held, that during the momentary pause breathing restarted, and that full recovery to the erect position took place with even movement of the spinal column, thus distributing any strain upon the disks.

But industry's method of selection, by trial and error, of suitable work for the "back" case is obviously unsatisfactory, and a scientific approach through careful physical functional analysis both of the man and of the machine offers the only practical solution to successful placement. There are three main lines of research.

1. *How to Prevent Threatened Injury in the Performance of a Specific Act.*—The majority of back strains will be avoided if the workman is properly instructed in the art of lifting. Inertia should be overcome and the movement of lifting initiated by the thigh muscles; but if the workman is so placed that he is unable to bend his knees when stooping to grasp the

weight, the lift is initiated through movement at the hip and spinal joints.

2. *How to Avoid the Act which is Calculated to Cause Injury.*—It may not be easy to place in a heavy gang a man wearing the label of light work, but there should not be the same difficulty about placing him in the heavy gang with instructions to the foreman that, although he should do his full share of hard work, he should not be employed in lifting from knee level or lower. Many a man who has suffered a prolapsed intervertebral disk could resume his work at machine or bench without symptoms or fear of relapse if objects which he previously lifted from ground level could be stacked at a height of from two or three feet (60 to 90 cm.).

3. *The Correct Selection of Personnel for the Specific Act.*—At present selection tests are used by the industrial psychologist to determine both adaptability and accident proneness. The anatomist has also made a selection of types that are able to perform certain specialized manœuvres more readily and more efficiently than others. This method of selection was used in the war for picking naval anti-aircraft gunners. But no detailed research has yet been undertaken to determine accident proneness in relation to physique and particular function. It has, for instance, been stated that the long thin type of man represents the "disk" type—i.e., that these individuals are prone to prolapse of an intervertebral disk. But this is certainly not borne out in the cases that I have seen, which include tall and short, slim and burly. It is not impossible that some relation may be found between the length of reach and the patient's height which may have a bearing on the problem. Perhaps a matter of some interest is that in cases of sudden prolapse of an intervertebral disk it is unusual to find *x*-ray evidence of other changes in the vertebral column. The buttressing of the vertebrae, sometimes spoken of as hypertrophic osteoarthritis, which is found in the spinal columns of many men who have undergone years of heavy work, is seldom seen in these cases.

With "Why" and "How" established, and the foundations well and truly laid, only the span of good will is necessary to bridge the gulf.

FIG. 1

FIG. 2

FIG. 3

FIG. 1.—Lumbar spine in the act of raising a weight with the breath held, showing upper three lumbar vertebrae fixed in flexion but the fifth lumbar vertebra extended with backward tilt on to the sacrum, tending to nip the disk. FIG. 2.—Same as Fig. 1, centred over the fifth lumbar vertebra. FIG. 3.—The same lumbar spine as Fig. 1, rising to exactly the same position but with the diaphragm free and showing even spacing between the fifth lumbar vertebra and the sacrum.

The Surgeon's Lost Touch

Surgery's lost touch with industry has been responsible for much unhappiness and much disability by concentrating on local morbidity instead of on general function. The surgeon seeks perfection in treatment, and his first concern is to restore the mutilated human body to conformity with accepted standards. But if he were to keep steadily in his mind that the ultimate aim of treatment is restoration of capacity for work it would sometimes be found that perfection in treatment could be obtained only at the sacrifice of human form.

At the age of 15 a boy had his right hand severely mangled in machinery. The first, second, and fourth fingers were lost at the time, the skin was stripped from the palm and from the remaining half of the third finger, the thumb was split and its metacarpal shared the fate of the others in the hand—being splintered. It was decided to rebuild the hand by plastic surgery. The first stage after cleansing was to bury the hand in the abdominal wall to secure the necessary skin flaps. This was successful, and gradually the process of reconstruction went on. Operation succeeded operation; the stump of the third finger was covered with skin, the second metacarpal was excised, a rotation osteotomy was performed on the fourth metacarpal. Three years went by, during which this boy alternated between the squalor of a city slum and the relative splendour of a lavishly equipped country hospital. Now he possesses something which resembles in appearance the congenital "lobster-claw" hand: one claw is immovable and insensitive, the other has feeble and tremulous movement, though so restricted in range as to be quite useless. A sheet of paper placed between the claws flutters away to the ground; a pencil can be thrust between them and held but not grasped. The young man is now attending the physiotherapy department of the city hospital, marking time before readmission to his "country residence" for the next operation in the series.

Now what of the patient himself? He was of fairly good physique, now rather run to fat, but, as his father puts it, he is "no scholar." School, in fact, "did not agree with him," and his entry into industry at the age of 14 marked for him escape from the thraldom of uncomprehended letters. He was eager to declare his manhood, to "muscle in" with his fellows into the strife that was his birthright. Three long years have now gone by, three years of daily contemplation of a pitiful and puny limb, hideous alike in its appearance and in its uselessness. Had that hand been amputated at once a modern prosthesis would have enabled the boy to return to his work in a few weeks, still rejoicing in his strength and brim-full of the enthusiasm of youth. But now what is left but a tale of lost incentive, lost interest, and lost opportunity?

Choice of Treatment

Perhaps the selection of the right form of treatment for the individual patient needs a wider knowledge and a greater experience than any other of the surgeon's duties. One of the most important considerations in restoring working capacity is how long the patient can afford to be away from work without suffering such loss of skill, dexterity, or training as will render him temporarily or permanently

unfit for his pre-accident work although the treatment for his surgical condition has been apparently successfully concluded.

The time factor is of importance in the selection of treatment, but of even greater importance is the patient's own psychology. In the case of the boy with the mutilated hand, a psychological study would have revealed at the outset that his happiness and success in life depend upon his ability to perform simple tasks requiring muscle work but a minimum of reasoning power or intellectual effort. He is not of the type that absorbs instruction easily or is able to profit by lessons in craftsmanship. He belongs essentially to that class of worker designated unskilled labour. Had he been of a different type, of average or more-than-average intellectual capacity, the long years of treatment might have been devoted to preparatory training for some skilled trade or profession, greatly to his and the community's advantage. But for this boy these years were obviously wasted and little could be done to mitigate the bitterness and frustration of thwarted ambition.

After selection of the type of treatment to be given there may still be a variety of different ways of carrying it through. For example, if the patient is suffering from thrombo-angiitis obliterans the selected treatment may be resection of the lumbar sympathetic ganglia, but there are two different methods of surgical approach to the ganglia. First the transperitoneal method through a midline or paramedial abdominal incision; and, secondly, the retroperitoneal method through the loin. This latter is undoubtedly the easier operation to perform, but the risks and difficulties of the former may be justified in certain cases in which section of the loin muscles is likely to interfere with capacity for work. This is but one of many examples in which the surgeon's choice is no more than a guess if he remains in ignorance of industrial conditions.

In theory there can be no difference between the relative importance of treatment for different diseases and different injuries. Each and every one is a challenge to the surgeon, to be met with all the skill and resource at his command. But in practice it has long been the custom to differentiate between major and minor injuries and also to make similar distinction between diseases. The skilled surgeon has tended more and more to restrict his activities to the treatment of selected groups of cases and to delegate to his less experienced colleagues the treatment of minor maladies and minor injuries.

Now this modern surgical perspective is the result of the intrinsic study of morbidity coupled, it is to be feared, with the necessity for the reward for labour. Contact with industry, with its demands for man-power and man-hours, will force the surgeon into a new perspective. The treatment of fractured necks of femurs is not the most important thing in life. In terms of human suffering and human happiness fractured fingers must take pride of place. The fractured femur is a rare occurrence in industry, and if every case became a total loss this would represent only a tithe of the loss and suffering occasioned by the thousands of fractured fingers which occur each year. I am not going to suggest that the fractured femur must be neglected for the fractured phalanx, but that equal care and skill shall be lavished on both. The function of the femur is to sustain the body weight, and the surgeon need seldom modify his technique in treatment to meet industrial requirements. But the function of the finger is far more complicated, and no surgeon can attempt to make the best of his treatment unless he is cognizant of the full industrial requirements of the injured finger. It may be that there are fractures of the proximal and middle phalanges of the little finger with involvement of the first interphalangeal joint. In such an injury it is not improbable that ankylosis would occur at the damaged joint. If the joint were fixed in extension instead of semiflexion the patient would be handicapped in the performance of such work as required the maximum span of the hand—e.g., use of a lever. But this position of the little finger would not incommode the mannequin, who might be seriously inconvenienced by the little finger fixed in semiflexion because of her inability to put on gloves without splitting them.

In dealing with the choice of treatment and its method of performance I have touched only on the surgeon's immediate responsibilities as they are reflected from industry, but to bring treatment to a successful conclusion much closer contact is necessary. In cases of accidents to the industrial worker it might fairly be stated that *treatment starts before injury.*

The Five Fears

In dealing with the problem of the treatment of the injured workman I must stress the importance of the elimination of the five fears—fear of pain, fear of deformity, fear of financial hardship, fear of industrial degradation and fear of litigation. The elimination of each one of these fears is the direct concern of the surgeon, although the final responsibility may rest elsewhere. Fear is conceived in ignorance and is dispelled by knowledge. And if propaganda, precept, and example are made to play their proper part much of the fear of injury may be eliminated. If every potential patient is convinced that his particular injury will be the especial care of a surgical specialist, that during the time of his sickness and convalescence he and his family will be properly cared for, that his future will be assured and he will not be lost in that backwater of unwanted men, light work, and that he will not have to spend weary months in straitened circumstances fighting for what he believes to be his right, then indeed treatment will have started before injury.

Co-operation in Treatment

To secure this happy state team work is necessary and may be accomplished only if the yoke of responsibility is shared by the managing director and the hospital consulting surgeon. The armies mobilized in the battle against disease and injury are as much in need of direction from a unified command as ever were the armies engaged in internecine warfare. To this end, then, the influence of the hospital surgeon must pervade every phase of treatment—starting within industry, continuing in home or hospital, and being carried through to its conclusion again in industry. In fact, he must become not only the surgeon in hospital but the surgeon in industry.

The design and equipment of the factory surgery must be a matter of prime concern to the consulting surgeon, whose ultimate responsibility is the treatment of patients who pass through that surgery to hospital. Unless the treatment carried out there is in exact conformity with his ideas of hospital treatment, the surgeon may find himself fighting a rearguard action in the face of infection and deformity instead of continuing the general advance towards full recovery. As a simple example—a guillotine amputation of the pulp of a finger may best be treated by an immediate skin graft, but if the finger has been soaked in strong antiseptic, a familiar form of treatment in many surgeries, the chance of a successful grafting in hospital is very much diminished.

Whereas the factory doctor's consulting-room must be the centre of the teaching and practice of pure industrial medicine, the factory surgery should be an outpost of the hospital. Its personnel, medical officers and nurses, must follow the same routine in treatment as their colleagues in

hospital, and this of course is possible only if the two departments are in constant touch with each other. During the last war the Medical Director of the Ministry of Supply, who was responsible for industrial health in the Government Ordnance Departments, arranged that medical officers and nurses from the factory surgeries should attend courses at a selected hospital in order to keep them in touch with those methods of treatment that were acceptable to the consulting surgeon who, under the Director, was responsible for the treatment of injuries. Similar liaison between the consulting surgeon and the department of the industrial medical officer is essential throughout industry if the optimum treatment is to be afforded to its personnel.

But if the benefits of this close co-operation between the surgery and the hospital are not to be nullified in the case of the injured, still earlier precautions must be taken. Someone must make a stand against the tyranny of tradition, and, as surgeons are not usually lacking in courage, let the consulting surgeon be the first to defy the law and burn the first-aid box.

Rehabilitation

Now after the first stage of surgical treatment is over, further treatment is concentrated on rebuilding the general health and physique of the patient and in restoring and perhaps retraining his muscles to enable them to meet the requirements of his daily work. In many cases the immediate return to pre-accident work is made possible because of the surgeon's particular knowledge of the job and his willingness to modify his treatment to meet its requirements. As a simple example, a waterproof dressing on an injured finger worn during working hours may be sufficient variation from hospital routine. In some cases the later phase of treatment is carried out in the so-called rehabilitation departments of the hospital—or, when the industry is large enough and where the directorate is sufficiently informed, in the rehabilitation department of that industry. In other cases rehabilitation is best given by returning the patient to alternative work under the supervision of the industrial medical officer.

Aim of Treatment

Treatment in a rehabilitation department may take the form of diversional exercises, occupational therapy, or vocational therapy, but the aim of treatment is the same—restoration of the ability to perform certain manœuvres with the strength, speed, and dexterity with which they were performed before injury. The surgeon will be failing in his duty if he does not inquire as carefully into the nature and duration of these exercises as he would into the circumstances of treatment of the more acute stages of disease. In hospital one all too often sees mixed classes of workmen engaged upon routine exercises, some of which are calculated to retard the recovery of the individual rather than to promote it. The selection and development of types of exercise for particular jobs are as important as is the selection of exercises for particular injuries and diseases. The majority of work is an athletic pursuit, and the prescribing of routine exercises for rehabilitation for all work is as likely to be successful as would be uniform training for a boxer, a professional golfer, and a boat-race crew.

In industry rehabilitation may be carried out in the rehabilitation workshop. This is nearly always a production unit whose output is essential. The unit, however, is run under sheltered workshop conditions and under the direct supervision of the industrial medical officer. It contains machines that are adapted to meet the requirements of specific injuries, and various bench jobs which provide such special exercises as may be prescribed. Here are machines incorporating in their design special devices for inducing specific joint or muscle action not necessary for normal production.

In general, extremely good results are obtained by the intelligent use of the rehabilitation workshop, but there are many pitfalls. One that is not uncommon is the over-exercising of joints by means of gadgets which necessitate a wider range of movement than is demanded by the patient's normal job. For example, a lever that can be fully operated only by producing eighty or more degrees of dorsiflexion and palmar flexion of the wrist may be ideal in redeveloping suppleness and muscle control in the typist or pianist but is calculated rather to retard recovery in the case of the heavy labourer whose normal wrist excursion may be reduced to some thirty or forty degrees. It must always be remembered that the greater the power demanded of the muscles crossing a joint the less is the range of movement in that joint.

Skilled work is all built up of conditioned reflex actions operating along well-beaten nervous paths. Injury and disease tend to interrupt those paths, and their redevelopment may be facilitated by the choice of suitable exercises calling forth the same co-ordination of eye and brain and limb. Conversely, an exercise that is calculated to cut across the chosen reflex path will delay the recovery of skilled action. The lower the reflex arc in the nervous system the less the fatigue from its accomplishment. It follows, therefore, that maximum benefit with the minimum fatigue will be obtained from exercises which are based upon fundamental reflexes or simple conditioned reflexes. Rhythm must never be neglected, and complicated exercises which call for independent use of each arm and each leg, and which ignore such elementary laws as that of negative successive induction, cause unnecessary mental and physical strain and obscure still further the paths of old-established conditioned reflexes.

Enough has already been written on the advantages of the exercise of selected work over treatment by massage and physiotherapy, but the pendulum must not be allowed to swing to the other extreme: both massage and physiotherapy are invaluable in treatment. But it is still a debatable point whether they belong essentially to the hospital department or whether they should be carried into industry. Undoubtedly selected cases are enabled to continue at work because of a few minutes of special treatment that may be available at their place of employment. An example of this is the wax bath, which helps to loosen up stiff fingers in very cold weather.

Unfortunately it sometimes happens that from the very start of treatment the surgeon knows that it will be impossible to return the patient to his former method of work. In such circumstances it may be possible for him to develop alternative function; and here again nothing but a profound knowledge of industry or industrial conditions will enable the surgeon to plan his treatment ahead.

I have already pointed out one of the risks of exercises which are calculated to produce an extreme range of joint movement, but in selected cases they have a definite place in treatment and in the development of alternative function. An example of this is the production of extra movement in the left wrist of the plasterer who as a result of an old injury has limited extension at the elbow. Extreme wrist movement might enable him to accomplish that smoothness of finish to a ceiling which is usually produced by rotation of the forearm and shoulder with the elbow fully extended.

Further Collaboration

It is now necessary to examine the possibilities of further collaboration. In the case of very large factories employing

thousands of men and women it may be possible to arrange for the surgeon to meet the industrial medical officers and executives regularly there in consultation and see for himself the conditions in which disease and accident arise and follow through the results of his treatment from rehabilitation shop onwards. The majority of industrial workers, however, are employed in small units, and obviously all cannot be visited weekly or even monthly; the surgeon may therefore have to be content with a general knowledge of work and working conditions, but he must always be prepared to make a special investigation when the health of his patient demands it.

As I have intimated earlier, the benefits of the liaison of industry and surgery are not limited to the physical health of the industrial casualties. Together they have much to contribute to the general happiness of mankind, together they may be called upon as the guardians of the public weal.

Of the "five fears" the fear of financial hardship was the first the legislature attempted to relieve. Attempts have now been made to banish the fear of litigation. Last year new workmen's compensation laws were introduced in which the responsibility for the payment of compensation devolved upon the State. When England first introduced workmen's compensation to the world it was a genuine attempt to secure for the injured workman a subsistence allowance during the period in which he remained incapacitated for earning. The payment of his weekly compensation bore a definite relation to his earning capacity and therefore operated as a true, although often insufficient, subsistence allowance. The new workmen's compensation laws ignore the principle of earning capacity and base payment upon the physical standard of the average man. Thus if a workman loses a foot it is calculated that his physical standard has been reduced by 30%, and after a limited number of weeks of benefit he becomes entitled to a pension of 30%. If his work be clerical he may still earn his full pre-accident wage and enjoy the additional pension for his physical injury. But what if he be a stevedore with no prospect of returning to his work? The memory that in former times he would have been entitled to 100% workmen's compensation until such time as his weekly pay-packet came within measurable distance of his old earnings can only plunge him into a more profound state of misery and fear.

I am not proposing to argue whether the principle of workmen's compensation is right or wrong or, indeed, whether it is an anachronism in these days of national insurance; but when the law was being altered it was the duty of the surgeon to point out that, far from allaying the patient's fear, this fear of financial hardship was likely to operate still more effectively in retarding the recovery of his patients. Who but the surgeon can assess that fear, and who but he has the knowledge and the authority to point out the absolute ineffectualness of basing workmen's compensation upon the average man? The "average man," conceived and born in Whitehall, is neither tinker, tailor, soldier, nor sailor; in fact, this average man has never done a day's work in his life, and yet he is set up as the 100% standard by which the casualties of industry are to be judged and pensioned.

The voice of the Royal College of Surgeons should have been raised in protest; it should have thundered at Westminster and reverberated throughout the land. Instead it remained silent. Was it silent through ignorance of industrial conditions, or could it have been that it did not recognize its responsibilities?

I have endeavoured to show that in the proper understanding and performance of his work the surgeon must maintain a close alliance with industry; that his patient's welfare and happiness are as necessary to the successful conclusion of treatment as is the application of his operative technique; that all the treatment he has to offer is both empirical and incomplete unless he studies to understand the conditions of his patient's work and the physical strains which are involved; that the greatest benefit he has to bestow on his patient is that independence of spirit that can come only with the power to work on equal terms with his fellows; that he has a duty to place his expert knowledge at the disposal of industry for the better organization of its work and the disposal of its man-power; and, finally, that the hospital and the factory are but small parts of the world that mark the sphere of his influence.

I now repeat my question—Is there a place in the hierarchy of specialists for the consulting industrial surgeon? I leave you to supply the answer, remembering that in this age of social service industry is the threshold of social surgery.

5,000 CONSECUTIVE DELIVERIES WITHOUT A MATERNAL DEATH DUE TO PREGNANCY

BY

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In the Halifax Municipal Obstetric Service there were between Sept. 12, 1946, and Oct. 5, 1948, 5,000 consecutive deliveries after the twenty-eighth week without a maternal death due to pregnancy. This number includes all women after the twenty-eighth week of pregnancy (*a*) who were admitted to the Halifax General Hospital from inside or outside the borough, whether to the general medical and surgical wards, the maternity department, or the special unit for the reception of septic cases, and (*b*) who were delivered in their own homes by the Halifax Domiciliary Service or independent midwives. It will be seen from this that the cases are drawn from the widest possible sources. No emergency has ever been refused admission. In this series there was one death from acute myeloblastic leukaemia and therefore not attributable to pregnancy.

Rufus Thomas (1940a) described the Croydon Obstetric Service and published the magnificent series of 3,144 consecutive deliveries conducted by this service between Jan. 1, 1938, and June 4, 1939, without a maternal death due to pregnancy. In this number there were two deaths—one from pneumococcal pneumonia and therefore not counted as a death due to pregnancy, and the other from post-partum haemorrhage on June 8, 1938 (Thomas, 1940b). This case was considered to be outside the scope of the paper, as the patient had been delivered at home by an independent midwife and admitted after delivery. It was, and, so far as I know, remains the largest consecutive number of cases with the lowest maternal mortality ever reported in this country or any other. This was indeed safe obstetrics, and with Croydon as a model and Thomas's work as inspiration it has been my personal ambition and the object and policy of the Halifax General Hospital at least to equal this achievement. Although the Croydon figure has been exceeded in Halifax by 1,856 deliveries it must be remembered that Thomas did not have the help of the later and more effective sulphonamides, blood and

plasma banks, penicillin, or the advantage of the knowledge of the rhesus factor in safeguarding against transfusion accidents. On the other hand, this series began, like his, after a maternal death; but it is still unfinished, as the total number of deliveries before another death occurs has yet to be determined.

At the Royal Halifax Infirmary there is a small maternity unit which deals annually with between 500 and 600 deliveries, mainly booked cases. My association with this institution is a recent one, and as all the infirmary cases are not my sole responsibility they are excluded from the total of 5,000 deliveries described here.

Description of the Service

The Halifax General Hospital has 450 beds—115 for obstetric and 35 for gynaecological cases. The maternity beds are distributed as follows: 80 lying-in, 25 antenatal, and 10 for potentially infected or septic cases. The hospital is a Part I training school, and it must be one of the few maternity departments in the country that have never been seriously short of staff.

Almost all the emergencies from Halifax and a surrounding densely populated industrial area, with a total population of about a quarter of a million, come to the General Hospital. Apart from emergencies, only primigravidae, patients with abnormalities, cases of multiple pregnancy, and those whose home conditions are unsuitable for delivery are admitted. Cases which become septic in the hospital are nursed in the special isolation unit, to which are also admitted septic cases from the domiciliary service and the county area served. There has been no death from puerperal sepsis in any of the admissions to this block since July, 1939.

The Emergency Blood Transfusion Service for the whole area is based on the General Hospital, where, in addition to the ordinary blood and plasma bank, a supply of group O rhesus-negative blood is always kept. No patient treated by this service has been lost in seven years.

The medical staff of the two departments consists of a registrar, a senior and a junior resident obstetrical officer, and an obstetric house-surgeon. As the obstetrician and gynaecologist in charge, I live within a few minutes of the hospital.

It is one of my main functions to attend at the antenatal clinics at the hospital and at the district home in the town. At these clinics all abnormal cases, whether the departure from the normal is medical or obstetrical, are seen and followed by me throughout the remainder of the pregnancy and labour.

It is a strict rule of the department that I am informed of all emergency admissions, of abnormalities, and of any condition which might even faintly threaten the life of the mother or child. No assistant is allowed to perform any major manipulation without my being present.

The Domiciliary Service.—The Halifax District Nursing Association is a voluntary body responsible for the domiciliary midwifery in the borough. It acts in this as agent for the local authority. The domiciliary service is based on the hostel "Kirby Leas," which is a Part II training school. It is run clinically as an integral part of the hospital, and in this way there is continuity of supervision by me of the difficult and abnormal cases.

The midwives carry "pitocin" and ergometrine to give by injection, and in a case of dire emergency threatening life—e.g., ante-partum or post-partum haemorrhage—they have the right to summon the emergency blood transfusion unit on their own initiative. In other instances the usual practice of summoning the patient's doctor is followed. There were 795 deliveries, and medical aid was sought 274 times.

Results

During the period under review there were 5,000 deliveries (Table I) and of these 2,498, almost half, were in women pregnant for the first time.

TABLE I.—*Showing Total Number of Deliveries, Some Major Complications, and Methods of Delivery*

	General Hospital	Domiciliary Service	Total
No. of deliveries	4,205	795	5,000
Primigravidae	2,377	121	2,498
Twins	58	11	69
Forceps	198	10	208
Manual removal of placenta	21	0	21
Caesarean section	98	0	98
Eclampsia	4	0	4
Stillbirths	104	13	117
Neonatal deaths	53	6	59

The forceps deliveries numbered 208—a rate of 4.7% in the hospital and 4.16% in the combined service. Caesarean section was performed 98 times—a rate of 2.33% in the hospital and 1.96% in the total number of deliveries. The placenta was removed manually on only 21 occasions, or once in every 238 deliveries.

There were four cases of eclampsia; only one of them a booked case, and that patient had a solitary fit after delivery. In the three unbooked cases there were nine, three, and four fits respectively. All four babies survived. The booked patient should not have had a fit, as there was ample warning, which was not heeded. I believe that eclampsia is always a preventable disease.

Live Births, Stillbirths, and Neonatal Deaths

There were 69 sets of twins in the 5,000 deliveries. The total number of births was therefore 5,069. There were 117 stillbirths, including all premature, macerated, and grossly abnormal foetuses, giving a stillbirth rate for the service of 23.07 per thousand. Of the 4,952 live births 59 babies died. The neonatal death rate is therefore 11.91.

TABLE II.—*Showing Stillbirths and Neonatal Death Rates*

	General Hospital	Domiciliary Service	Total	Croydon	National 1946
Total births	4,263	806	5,069	3,178	842,809
Live births	4,159	793	4,952	3,086	819,814
Stillbirths	104	13	117	92	22,915
Neonatal deaths	53	6	59	43	—
Stillbirth rate	24·63	14·88	23·07	28·9	27
Neonatal death rate	12·74	7·56	11·91	13·9	22

Table II shows the total live births and stillbirths together with the stillbirth and neonatal death rates. For comparison the figures for Croydon from Jan. 3, 1938, to June 4, 1939, and those for the whole country for 1946 are included. The latter are the "latest available provisional figures" for a complete year, and have been supplied by the Ministry of Health. The stillbirth rate for the Halifax Municipal

TABLE III.—*Showing Some Causes of Stillbirth and Neonatal Death*

	Stillbirths			Neonatal Deaths			Total Combined Service
	Gen. Hosp.	Dom. Serv.	Total	Gen. Hosp.	Dom. Serv.	Total	
Dystocia and intracranial haemorrhage	17	2	19	12	2	14	33
Gross foetal abnormality	19	2	21	11	0	11	32
Prematurity	5	0	5	16	1	17	22
Maternal toxaemia	14	1	15	3	0	3	18
Maceration	16	1	17	0	0	0	17
Prolapse of cord	11	1	12	0	0	0	12
Ante-partum haemorrhage	12	0	12	0	0	0	12
Cause unknown	4	6	10	0	1	1	11
Rh. incompatibility	6	0	6	3	0	3	9
Pneumonia	0	0	0	5	1	6	6
Atelectasis	0	0	0	3	1	4	4
Total	104	13	117	53	6	59	176

Service is thus 3.93 lower and the neonatal death rate 10.09 lower than the national rate.

In Table III are set out the principal causes of stillbirths and neonatal deaths, given in their numerical order. The largest number were due to trauma during labour, and these form 18.75% of the total. Gross foetal abnormality (mainly anencephaly, spina bifida, and hydrocephaly) is a very close second with 18.18% of the combined stillbirths and deaths under 1 month. Of the total stillbirths and neonatal deaths 27.84% are accounted for by gross foetal abnormality and maceration, and at the present time it would seem to be impossible to reduce the numbers from these two cases. The greatest field for improvement lies in reducing the number of stillbirths and neonatal deaths caused by trauma, prematurity, and pregnancy "toxaemia."

Treatment of Major Complications

A brief outline of the treatment of the major complications, the choice of sedatives and anaesthetics, and the management of the puerperium is given below.

Ante-partum Haemorrhage.—This condition is treated conservatively until there is a definite indication to intervene. In all cases, when first seen, blood is immediately taken for grouping and cross-matching. Vaginal and rectal examinations and the giving of enemata are strictly forbidden. When it becomes necessary to intervene—e.g., in the case of small recurrent haemorrhage—every patient, no matter how good her general condition, has an intravenous drip started. With blood ready to be given, the patient is examined vaginally under anaesthesia in the operating theatre. If her condition is grave from loss of blood this examination is omitted and caesarean section is performed. In eight years, with a total of 12,830 deliveries in the hospital alone, only one case of ante-partum haemorrhage has been lost, and that death occurred in 1944 from concealed haemorrhage, and therefore does not come into this series.

Placenta Praevia.—This is treated almost always by rupture of the membranes or by caesarean section. The lower-segment operation is the one invariably used. Application of Willett's forceps and plugging with the half-breech are used only on very rare occasions. Packing and the insertion of an intrauterine bag have never been practised.

Accidental Haemorrhage.—This is treated by morphine, "pitocin," plasma or blood transfusion, and rupture of the membranes. Only once in eight years has it been necessary to perform caesarean section and only once to carry out a caesarean hysterectomy for this condition.

Post-partum Haemorrhage.—An attempt is made to prevent third-stage haemorrhage by giving "pitocin," 1 ml. intramuscularly, in the following conditions the moment the child's shoulders are born: prolonged labour, uterine inertia, overdistension of the uterus, delivery under anaesthesia, the presence of fibroids in the uterus, and in any patient who has anaemia. Cases of placenta praevia and accidental haemorrhage receive ergometrine, 0.25 mg. intravenously, as soon as the anterior shoulder has been born. If the placenta is not ready for delivery in half an hour from the birth of the child, or if there is even slightly more than the average amount of bleeding, "pitocin" is given as described above. If the placenta fails to be delivered promptly after the "pitocin" manual removal is carried out. Should the bleeding be heavy and the uterus atonic, ergometrine, 0.25 mg., is given intravenously. So far the intravenous ergometrine has been successful in stopping the bleeding in every case except the one complicated by acute myeloblastic leukaemia. Resuscitative measures can then be undertaken, and the administration of ergometrine does not, in my experience, make a manual removal any more difficult should this be required. Bleeding after the delivery of the placenta is treated by intravenous ergometrine. Intrauterine douches are never used.

Pre-eclampsia and Eclampsia.—Emphasis is placed on abnormal gain in weight as an early sign of pre-eclampsia. On an average the weekly gain should not exceed 8 oz. (225 g.). The maximum normal systolic blood pressure is taken as 120 mm. Hg and the diastolic as 80 mm. Hg. Oedema is always considered to be pathological, and when, in the absence of pus, there is albumin even in the smallest amount in the catheter specimen the disease is far advanced. Pre-eclamptic patients are treated by absolute rest in bed in hospital, with a low-sodium and low-protein diet and sedatives. Of the sedatives chloral hydrate and potassium bromide and "nembutal" are the most commonly used. If there is vomiting, sodium phenobarbitone, 3 gr. (0.2 g.), is given intramuscularly. Liberal use is made of 20% glucose solution in water intravenously in severe cases or in those with gross oedema. Ammonium chloride is also given for the latter condition. If the maximum diuresis is to be secured by the concentrated glucose solution a whole litre must be run into the vein in from 30 to 50 minutes. No attempt is made to interrupt the pregnancy unless the mother's condition is deteriorating. By following this rule the incidence of prematurity in these patients has been greatly reduced. I do not believe that chronic nephritis or permanent vascular damage is ever caused by pre-eclampsia or eclampsia; nor is a latent hypertension made manifest or "unmasked" at an earlier age by the pre-eclamptic pregnancy.

I cannot too strongly condemn rupture of the membranes in a patient with a long closed cervix. Rupture of these to induce labour in this condition should be done in only those cases in which the cervix is taken up, is beginning to dilate, and is easily dilatable and soft—a condition which has aptly been described as "ripe." If the cervix is long and closed and the patient's condition is deteriorating rapidly in spite of treatment then caesarean section under local analgesia should be the method of delivery.

Eclampsia is treated by morphine sulphate ¼ gr. (32 mg.) and sodium phenobarbitone or "nembutal" intramuscularly. Apart from loosening the clothes, the patient is not undressed or examined in any way until she is heavily under the influence of sedatives. Glucose, 20% solution, is used in all cases. Magnesium sulphate, 50% solution, for intramuscular injection, is kept in reserve for the cases which do not respond: these are exceedingly rare. When there has been no fit for twenty-four hours the patient is examined vaginally, and if the cervix is "ripe" the membranes are ruptured. So far, caesarean section has not had to be performed for eclampsia.

Infection.—Of the sulphonamides, sulphadiazine is the drug most often used. Penicillin is reserved for cases that do not respond or for cases that are severe at the onset. As a prophylactic against infection penicillin is given to all cases of manual removal of the placenta, failed forceps, and internal version, and to those in which the membranes have been ruptured for more than twenty-four hours or the labour has been unduly prolonged. If caesarean section is to be performed on an infected or potentially infected patient a million units of penicillin are left in the peritoneal cavity and the drug is given systemically for five days after operation. In urinary infections sulphanilamide is used on account of its free solubility.

Disproportion.—The borderline cases are given a trial labour and if this fails lower-segment caesarean section is performed. In all primigravidae in whom the head is not engaged near term antero-posterior, inlet, lateral, and outlet radiographs of the pelvis are taken. Frequent use is made of lateral *x*-ray films to follow the course of a trial labour, and these have been most helpful.

Cardiac Disease.—This is treated in mild cases by frequent periods of rest in hospital during the pregnancy. In the severe cases the patient may spend the greater part of the pregnancy in hospital. Caesarean section under local analgesia is reserved for the severest cases. All patients with valvular disease are given penicillin for a week after delivery in an effort to prevent infection, which even in a mild form so often leads to a marked breakdown in the cardiac reserve.

Sedatives and Anaesthetics.—Pethidine in doses of 100 mg. intramuscularly is the routine sedative used. It is often combined with hyoscine hydrobromide 1/150 gr. (0.43 mg.). Since the introduction of pethidine it is rare to have to use morphine. A "heavy" spinal analgesic is used to anaesthetize the perineum if forceps are required for a patient with respiratory or cardiac disease. Spinal analgesia is never used for other forceps deliveries or for caesarean section. In a healthy patient these operations are carried out under general anaesthesia. Local analgesia is employed for caesarean section when indicated by the general condition of the patient.

The Puerperium.—The patients are allowed out of bed on the seventh day and normal cases are discharged on the tenth day. Active movement and breathing exercises are encouraged from the very beginning. Each ward is visited daily by a physiotherapist, who conducts the exercises. During a period of eight years, with 12,830 deliveries, there have been only two deaths from pulmonary embolism.

Discussion

In addition to the series here presented there were from 1944 to 1946 in the General Hospital three separate series, of 1,050, 1,346, and 1,730 deliveries, without a maternal death, and it must be stressed that such results are the outcome of a co-operative effort on the part of the whole staff of both parts of the Municipal Service and of the general practitioners in the area.

Particularly must I lay emphasis on the loyalty and diligence of the resident and nursing staff, who have given service far beyond the power of gold to buy. The excellence of the general administrative arrangements and the ancillary services provided have contributed greatly. Other factors of importance are the large proportion of antenatal beds and the continuity of specialist supervision for abnormal cases.

Of the therapeutic agents, blood, plasma, penicillin, and the sulphonamides have played a great part. It is important to give blood in adequate amount; for example, one greatly exsanguinated woman received 10 pints (5.68 litres), and at one stage two veins were being used at the same time to give the blood under pressure of oxygen. Such treatment has been made possible by the wonderful facilities provided by the Leeds Regional Blood Transfusion Service. Glucose 20% solution, too, has played its part, and Dieckmann (1942) has stated that the proper use of hypertonic glucose solution in pregnancy is one of the outstanding accomplishments of modern obstetrics. In third-stage and post-partum haemorrhage, ergometrine, given intravenously, has proved life-saving and deserves to rank in importance in obstetrics with penicillin.

These potent remedies together with modern methods of anaesthesia are great advances, but the most important single factor is the skill and ready availability of the senior staff to deal personally with abnormalities. It can be shown that the maternal mortality rate in the cases delivered in the General Hospital is lower than the rate for the borough as a whole.

In the last ten years the borough deliveries numbered 14,833, with 43 maternal deaths—a rate of 2.89. In the same period the General Hospital, dealing with almost all the emergencies from inside and outside the borough, had 14,324 deliveries with 24 deaths, giving a rate of 1.67. And it is noteworthy that part of this decade was before the introduction of blood banks and penicillin, and that as late as 1946 (the last year for which complete figures are available) the national rate was 1.43.

In the Ministry of Health Report (1937) Halifax was shown to be the county borough with the blackest maternal mortality record in the country. It occupied an almost equally unenviable position in the R.C.O.G. Report (1944), in which for the years 1939 to 1942 it was placed seventh on a list of county boroughs with the highest rate in England and Wales. This, however, was largely due to the eleven maternal deaths in Halifax in 1940; only two of these occurred in the General Hospital and one on the Domiciliary Service.

It is true, then, to say that the high rate for the borough was on a list of county boroughs with the highest rate in deaths in the General Hospital or on the Domiciliary Service, where in the same ten-year period there were 13,389 deliveries with the death of only one woman.

Summary and Conclusions

Along the lines suggested by the Royal College of Obstetricians and Gynaecologists (1944) we have attempted to bring about the integration of the hospital, antenatal, domiciliary, and specialist services in the Halifax Municipal Obstetric Organization.

Between Sept. 12, 1946, and Oct. 5, 1948, there were 5,000 deliveries after the twenty-eighth week without a maternal death due to pregnancy.

The stillbirth rate in the series was 23.07 and the neonatal death rate 11.91.

A brief summary of the treatment of some major complications has been given.

The Halifax General Hospital has a large proportion of cases from the county area, and therefore the number of its deliveries in the last decade almost equals the total ascribed to the borough.

In this ten-year period the maternal mortality rate in the General Hospital was 1.67; in the Halifax Borough it was 2.89.

The belief is expressed that the most important single factor in reducing maternal mortality is the provision of skilled staff to deal with abnormalities.

This series began after a maternal death from pulmonary embolism and continues without a maternal death attributable to pregnancy at the time of writing (Oct. 6, 1948).

I am grateful to the M.O.H. for Halifax, Dr. G. C. F. Roe, for permission to publish these results and for the statistics relating to the Borough. My thanks are due to Mr. H. I. Deitch, medical superintendent and surgeon to the General Hospital, for his great help in many difficult cases and for encouraging the development of the maternity department of the hospital.

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A STATISTICAL AND CLINICAL REVIEW OF 107 CASES OF ECTOPIC GESTATION

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Ectopic pregnancy is a condition encountered by all clinicians engaged in general medical and surgical practice. The management usually falls to the gynaecologist, but the problem of the differential diagnosis concerns all, and in many cases the operative treatment has to be done by the general surgeon.

Keeping that in mind, we have undertaken a survey of all cases of ectopic pregnancy occurring in a busy municipal hospital over a ten-year period. The findings are instructive in showing that the question of aetiology has not finally been settled. It is, however, in the sphere of diagnosis that we believe the value of such a survey lies. The various symptoms and physical signs are evaluated in the light of the case records and an attempt is made to ascribe to each its true place and importance. The treatment and general results are also considered.

Despite the enormous literature on ectopic gestation, few recent surveys of this type have been made, and nearly

all of these were in America. Several will be referred to subsequently.

Present Series

The cases in this series numbered 107. The average age of the patients was 29.9 years. This is in accordance with previously noted figures. The ages varied between 20 and 42. On an average the patients had had 1.25 pregnancies, and 34% of all the pregnancies ended in abortion—a rather high figure.

The time interval between marriage and ectopic pregnancy, or between the ectopic and the last intrauterine pregnancy, averaged 5.8 years. This finding agrees with the figures of Woodhouse (1940), Ware and Winn (1941), Marchetti *et al.* (1946), and MacFarlane and Sparling (1946). It supports the view that sterile or relatively sterile women are more prone to ectopic gestation. Whether this is a result of pelvic inflammation is another matter, and will be dealt with more fully later.

Right- and left-sided tubal pregnancy occurred in 55 and 50 cases respectively. There is thus no real preponderance of the right side as has been suggested by Mayo and Strassmann (1938) and by Nucci (1946). The theory is attractive, as the right side is that more likely to be involved following lesions of the appendix. Ovarian pregnancy occurred in 2 (1.87%) of the 107 cases. The usually quoted figure is 1%. There were six cases of recurrent ectopic gestation—an incidence of 5.6%. Nucci's figure is 6.6%.

At operation it is extremely difficult to say where the ovum originally embedded. This is particularly so if there is an old rupture with haematocele formation or if a tubal abortion is in progress. In this series fully 50% were definitely ampullary, about 10% were fimbrial, and a further 20% might have been either of these. Isthmic forms made up 10% of the total, and at least two of the most severe type were interstitial.

Causation of Extrauterine Pregnancy

We have considered the causation under six headings, really working on a basis of Novak's (1947) classification, and we attempted to evaluate this as a criterion.

1. *Pelvic Inflammation.*—A history of anything possibly classifiable as genital infection was obtained in only seven cases. In 18 cases there was a history of one or more previous abortions, most of which took place some years before the ectopic pregnancy, and in no case was an abortion followed by prolonged subsequent upset. No patient gave a history of puerperal sepsis, but it is realized that some degree of puerperal or post-abortive morbidity may have been overlooked or forgotten. In several cases there was a normal delivery in the interval from the last abortion.

The operative findings were carefully recorded and gave the following information. In a total of eight cases there were some peritubal adhesions, but a certain proportion of these dated from the first blood leakage and were associated with the haematocele present. Hydrosalpinx was found in one case, and bilateral tubal occlusion following an old ileo-caecal tuberculous process in another. A chronically inflamed appendix was encountered at one operation for right tubal pregnancy.

These figures would suggest that pelvic inflammatory disease, particularly gonorrhoea, but also post-abortive and puerperal sepsis, has been much overrated as a cause or predisposing factor in ectopic pregnancy.

Many of the authorities are absolutely convinced of its importance, and Dougal (1937) estimates pelvic infection as a cause in 50% of cases. Novak (1947) supports this view, and Woodhouse (1940) puts the figure as high as 65.8%. These latter were cases giving a definite history, or showing evidence of pelvic inflammation at operation. MacFarlane and Sparling (1946) find a history of previous abortion in 32.7% of their cases and say that this is of unquestionable importance in the causation of ectopic pregnancy. They had a total of 17.2% proved cases of pelvic infection. Marchetti *et al.* (1946) do not agree about the role of infection, and say that in most instances the aetiology is not clear. Dodds (1940) considered that in his series the possible predisposing causes were unconvincing.

2. *Previous Pelvic Operations.*—It does seem that previous operations on the pelvis may have a bearing, and it would be reasonable to expect conditions complicated by infection or peritonitis to be most prolific of ectopic gestation. In this series six patients had had appendicectomy, the appendix being ruptured, with local peritonitis, in one case. Six patients had had ectopic pregnancies, two had had ovariotomies, and two had had pelvic operations for tuberculous glands. Thus 16 of the 107 cases had previously had an operation. Farell and Scheffey (1943) found that 26% of their cases had had previous abdominal operations. Dodds's (1940) figures for previous pelvic operations would work out at 20%.

3. *Congenital Abnormalities.*—The importance of congenital abnormalities or defects must be very difficult to estimate, and would be small.

4. *External Factors Altering the Lumen of the Tube.*—Alteration in calibre of the Fallopian tube and distortion due to external factors would seem to be a more likely cause. In this series we found the following:

Cystic or enlarged ovaries noted (not corpus luteum)	16 cases
Fimbrial or parovarian cysts	3 „
Uterine fibroids in a position to obstruct the affected tube	1 case
Tubal fibroid on uterine side of ectopic sac	1 „
Endometrioma of broad ligament	1 „

The enlarged or cystic ovaries were usually studded with a series of follicular cysts. These were seldom larger than ½ in. (1.9 cm.) in diameter, but occasionally needed surgical attention. Many cases were not carefully examined, so that the incidence of these cysts is not fully recorded. The latter were the severe intraperitoneal rupture cases. Certain cases show this relationship very clearly. We have seen a tubal abortion in which the ectopic sac extended medially to a kink in the Fallopian tube caused by the pressure of a simple ovarian cyst the size of a pullet's egg.

5. *External Transmigration of the Ovum.*—One case afforded evidence of this. The ovary had previously been removed on the affected side and the tube on the opposite side.

6. *Tubal Spasm.*—This is held to be a very important factor but we have not been able to collect any helpful information. In only two cases had a tubal insufflation been done—in both some time previously. A history of attempted abortion was given in three or four cases, but quite what the true incidence of this would be we do not know. From the very high rate of induced abortion in this particular district it would seem reasonable to regard it as a possible factor.

Diagnosis in Relation to Symptomatology

The proportion of cases in which particular symptoms appeared are as follows:

Abdominal pain	98%
Vomiting associated with the pain	41%
Faintness „ „ „ „	42%
Anomalous uterine bleeding	76%
Amenorrhoea (including late or overdue period in a woman normally of regular cycle)	71%
Shoulder pain (including pain in the upper arm and in the upper chest or pectoral region)	37%
Bladder symptoms	26%
Rectal symptoms	16%

It will be seen that pain is by far the most reliable and constant symptom. It may be of any type, depending on the pathology. Pain sufficient to cause vomiting is a common description, and there is no doubt that it is a help in diagnosis. Nausea is not included in this estimate. The incidence of shoulder pain is higher than has previously been reported, and is a valuable diagnostic guide. The importance of bladder symptoms in diagnosis has never been fully recognized. These usually take the form of dysuria and frequency due to bladder irritation. In many of these cases urinary investigations were done and failed to reveal

any evidence of infection. Rectal irritation was evidenced as pain on defaecation, sacral pain, or diarrhoea.

There is general agreement on the importance of abdominal pain, amenorrhoea, and anomalous bleeding as the important triad. MacFarlane and Sparling (1946) found nausea and vomiting due to pain in 30% of their cases, while 35.4% complained of faintness due to pain; in 11.8% there were bladder symptoms. Marchetti *et al.* (1946) did not find nausea and vomiting with any regularity, although they noted faintness due to pain in 29.1% of cases and shoulder pain in 8.5%. Dodds (1940) reports that seven of his 19 acute cases had shoulder pain.

Diagnosis in Relation to Pathological Types

Cases of ectopic pregnancy may come under one's care at any stage of the pathological process, and the findings differ so much that some attempt at classification must be made. We have taken as a basis that of Dougal (1937). Briefly, the four types are: (*a*) where the ovum is still in the tube and there is little or no haemorrhage into the abdomen; (*b*) tubal rupture or abortion with diffuse intraperitoneal haemorrhage; (*c*) tubal rupture or abortion with encysted haemorrhage; and (*d*) advanced ectopic pregnancy. We have taken (*a*), (*b*), and (*c*) and termed them Types 1, 2, and 3, respectively. Our Type 1 group includes cases with a somewhat more generous blood leakage, while under Type 3 are included the subacute cases with haematocele formation, even if not actually encysted.

Diagnosis in Relation to Physical Signs

The physical findings are considered in relation to the pathological type of ectopic gestation. Taking them in order, the incidence was as follows:

Type 1 (29 Cases)

Tenderness in iliac fossa or suprapubically	89%
Softening of the cervix	89%
Tender swelling felt per vaginam	82%
Uterine enlargement	62%
Pain on moving the cervix	58%
Breast activity	53%
Pulsation felt in fornices	2%

Type 2 (48 Cases)

Tender on abdominal examination	100%
Pain on vaginal examination (done in 39 cases only)	97%
Fullness felt on vaginal examination (ditto)	87%
Evidence of internal haemorrhage	85%
Distended abdomen	77%
Patient prostrate	56%
Abdominal resistance or guarding	50%
Free fluid in abdomen	41%
Tube palpable	Nil

Type 3 (28 Cases)

Mass felt on vaginal examination (with or without general anaesthesia)	100%
Tender on vaginal examination	96%
Abdomen tender on examination	89%
Softening of the cervix	88%
Pain on moving the cervix	84%
Uterus enlarged	65%
Uterus felt separate from the swelling	61%
Breast activity	54%
Patient pale in appearance	54%
Abdomen distended	50%
Patient apparently ill	46%
Abdominal guarding or resistance	32%
General feeling of tumour on abdominal examination	32%

Thus it is seen that all types, and particularly Type 2, have abdominal tenderness.

Pain on vaginal examination is the other common finding. This is usually elicited in the posterior or lateral fornix. A tender swelling is the usual accompaniment in Type 1, generalized fullness is all that can be made out in Type 2, while a vague mass in the cul-de-sac is the common finding in Type 3.

Softening of the cervix is a very important diagnostic point and occurs in nearly 90% of Type 1 and Type 3 cases; it is of less diagnostic importance in Type 2, and is often overlooked in the obvious cases of that group. Pain on moving the cervix with the finger would appear to be a less reliable finding than tenderness in the fornices.

The presence of breast activity was a great diagnostic help in the less acute cases. Where there had been frank rupture and diagnosis was obvious it was surprising how often the breasts were not examined or at least no record of their condition was made.

Enlargement of the uterus was noted in 60–65% of Type 1 and Type 3 cases; it cannot be demonstrated in Type 2 cases.

In Type 2 there is very often evidence of internal haemorrhage, the abdomen is rather distended, and free fluid may be demonstrated. There is some degree of resistance or guarding in about half of the cases.

In Type 3 the patient often looks pale or ill. The average pulse rate was worked out for this group, and was 104 per minute. The temperature averaged between 99 and 100° F. (37.2 and 37.8° C.), with evening readings as high as 101° F. (38.3° C.). There may be some distension of the abdomen, but a tumour is rarely felt, and rigidity is also rare. In fully half of the cases the uterus was felt separate from the pelvic mass on vaginal examination.

The other signs, the blood investigations, pregnancy diagnosis tests, and curettage are usually too slow and unwieldy to be of value. We must admit, however, that the pathologist's report led to our exploring one of the cases.

Reference to the literature shows no great disagreement on these matters. Some authors stress the importance of one sign and some favour another. It must be remembered that diagnostic criteria are comparable only when a similar stage of the pathological process is encountered. There is a tendency both here and in America to discount the value of colpotomy, curettage, and haematological investigations in diagnosis.

Treatment

Blood Transfusion.—It has been our custom to give blood at once to the Type 2 cases admitted in a state of collapse. The theatre is meantime prepared and the patient is taken there with the blood-drip transfusion running. This is continued during the operation, and afterwards for as long as is necessary. We do not agree with those who say that blood should not be given before the operation is begun. Neither do we agree that operation should be postponed (in Type 2) till the general condition is greatly improved. The number of cases requiring blood transfusion was 41, and the average amount of blood given to each transfused patient was 1,080 ml. A reaction in the form of raised temperature and slight jaundice was observed in one case, but was quickly overcome. In nearly every case group O stored blood was given.

Williams and Corbit (1944), investigating 101 deaths from ectopic pregnancy, found that only 37 of the patients had received blood transfusion. Only four had more than one transfusion, although the time interval could have allowed of others. MacFarlane and Sparling (1946) transfused 57% of their cases, while Marchetti *et al.* (1946) transfused 42.16% of theirs.

Operative Treatment.—It was Lawson Tait (1888) who thoroughly established the treatment of ectopic pregnancy. The treatment is surgical and the earlier it is done the better. We think that if the patient is exsanguine and shocked it is reasonable to start blood replacement at once, with the other resuscitation measures. So far as the actual operation is concerned, it is advisable to do the least possible when the patient is in a serious condition. The affected tube is removed and haemostasis secured. In this series the following operations were done:

Salpingectomy	77
Salpingo-oophorectomy (one bilateral)	24
Oophorectomy	2
Removal of sac of pregnancy only	1
Partial salpingectomy	2
Laparotomy only	1
Cysts necessitating ovariotomy or cystectomy	7

Thus it will be seen that salpingectomy is usually sufficient, and in common with others we advocate total salpingectomy. The risk of recurrence in the same tube is otherwise said to be high. It is mainly in Type 3 cases that salpingo-oophorectomy is necessary, and is due to involvement of the ovary in the haematocele to such an extent that it cannot be dissected clear. Ovariotomy is necessary in cases of ovarian pregnancy. The comparatively large number of cases with some cystic involvement of the ovaries will be noted, and was mentioned previously.

The above procedure is fairly standard. Mayo and Strassmann (1938) stress the importance of conservative measures. Dodds (1940) preserves the ovaries wherever possible, while Dougal's (1927) figures show that he was less conservative in treatment. There has apparently been a tendency in America to do operations for other abnormalities discovered at the time of dealing with the ectopic pregnancy. Williams and Corbit's (1944) investigations of mortality figures have led them to condemn the doing of multiple non-essential operations.

There was one death in this series, giving a mortality rate of 0.93%.

The number of days in hospital before operation was taken as a method of assessing the accuracy of diagnosis. All the days the patient spent in hospital before the operation are counted. The average time was 2.8 days. Marchetti *et al.* (1946) record that 27% of their cases were operated on within 24 hours of admission, while 70.2% had operation within 48 hours.

Summary

A series of 107 consecutive ectopic pregnancies occurring over a ten-year period is reviewed. The findings are compared with those of recent reviews.

In respect of aetiology we find little support for the time-honoured view that previous pelvic inflammation is all-important. We believe that previous operations on the pelvis are a predisposing factor, and we are strongly of the view that extratubal factors causing alterations in calibre of the lumen are an important cause.

Diagnosis is considered in relation to symptomatology, pathological types, and physical findings. Our figures show that carefully taken histories reveal a very much higher incidence of helpful diagnostic symptoms than has previously been reported. For example, we find a high percentage of those patients complaining of vomiting and faintness due to pain, of shoulder pain, and of irritative bladder symptoms.

The treatment of these cases has been orthodox in every way. We attach particular importance to the free use of blood pre-operatively, without delaying the operation once the diagnosis has been made.

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ENDOGENOUS GAS GANGRENE COMPLICATING CARCINOMA OF COLON

REPORT OF A CASE

BY

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Clostridium welchii is commonly present in the human intestine. Its pathogenic qualities are well known, yet it is rare for gas gangrene to complicate diseases or surgery of the alimentary canal unless introduced from outside. Rare though it is, this complication has long been recognized. Welch (1900) gave three examples of primary emphysematous gangrene of the abdominal wall which he believed started from the intestine. Greeley (1918) described two cases of "idiopathic *Bacillus aerogenes capsulatus* infection." In one of his patients the blood culture was positive three months before death. In the case described below, the organism was grown from the blood 17 days before death.

Several writers have reported endogenous gas gangrene arising after operation, especially after appendicectomy (Eckhoff, 1930; Gamble, 1935; Johnson, 1936; Smith and Zimring, 1939; Breslin, 1940). Jennings (1931) found that 90% of cultures made from the contents of the lumen of appendices removed at operation grew *Cl. welchii*.

Gas gangrene may arise even when no operation has taken place. Gordon (1936) treated conservatively an appendix abscess which ruptured and formed a pelvic abscess. Gas gangrene of the right thigh developed, and at necropsy it was seen that the peritoneum and fascia overlying the iliacus muscle had been eroded and that the gas gangrene had spread down this muscle to the lower limb.

It may also arise after typhoid ulceration and tuberculous ulceration of the small intestine (Knapper, 1929; Galiana and Balaguer, 1946). Dawson and Hardy (1948) reported emphysematous cellulitis of the left thigh resulting from diverticulitis.

Case Report

The patient, a man aged 65, had all his teeth extracted in September, 1947. A few days afterwards he felt some pain in the lower abdomen on the left side. He had to strain to defaecate, and when he was successful the pain disappeared. Later he felt as though his bowels were not completely emptied after defaecation, and the pain was not completely relieved. The motions were soft, without blood or slime. His appetite was poor and he had lost weight. There was no nausea or vomiting, and urination was normal. He was admitted to hospital on Nov. 14, having been febrile for four days. He had had an operation for bilateral inguinal hernia in 1915.

On examination he was flushed and looked ill. The temperature was 102° F. (38.9° C.), pulse 80, and respiration 20. The gums were healthy, the throat clean, and the tongue furred. Some petechiae were seen on the floor of the mouth. The abdomen was tumid and there was a tender indurated area with slight erythema above the left Poupart's ligament. The herniotomy scars were healthy. Neither spleen nor liver was felt. Intestinal movements were audible. Rectal examination revealed nothing abnormal. There was a slight degree of kyphoscoliosis of the spine but no local tenderness. The patient kept his hips flexed, and there was some pain in the left hip on external rotation. A blood culture was taken before any treatment was given.

The next day the reddening of the skin was more apparent in a line 6–8 in. (15–20 cm.) long, about 1 in. (2.5 cm.) above and parallel to the left inguinal ligament. He was very tender near the left anterior-superior iliac spine. Penicillin and sulphamezathine were given.

In the course of the next few days the inflammation spread down the thigh, chiefly on its anterior and medial aspects, as far as the knee. The skin was red and brawny, with a small necrotic patch in the mid-thigh. A fine crepitation in the region of the anterior-superior spine was palpable. On Nov. 19 Mr. W. K. Targett incised the thigh. "With a large aspirating needle, foul-smelling greyish-brown pus was obtained fairly superficially in the thigh (inner side). An incision in the same area opened a superficial 'space' containing gas and more pus. This was lined with greyish necrotic material. A drain was inserted. A second incision lower down was made. More gas and pus were found. The whole process was more like a generalized infiltration than a true abscess." Anti-gas-gangrene serum was given.

After the operation the patient's general condition improved a little, but locally there was an extension of the inflammation below the knee, with effusion in that joint and oedema of the leg. A black bulla was present in the thigh. Soon a necrotic area joined the two incisions. Subcutaneous crepitus could be felt in the upper and outer part of the thigh (Fig. 1).

FIG. 1.—Wound in left thigh and extent of inflammation one week after operation

On Nov. 27 a fresh spontaneous sinus appeared near the knee posteriorly. The following day a morbilliform rash attributed to the sulphamezathine appeared on the right thigh and then spread generally. By Dec. 1 he looked worse; he became drowsy and dyspnoeic, and died the next day.

Investigations.—Nov. 15:—blood culture: growth of *Cl. welchii*; blood count: Hb, 90%; red cells, 5,140,000; white cells, 17,000 (polymorphs 81%). Nov. 17:—radiography: chest normal; spine and pelvis, no destructive bone changes seen; shows edentulous. Nov. 19:—swab from wound: direct film—many Gram-positive and Gram-negative bacilli and cocci; aerobic culture gave a growth of non-haemolytic streptococci, coliform bacilli, and Gram-positive sporing bacilli. Anaerobic culture: no anaerobes isolated. Nov. 25:—radiography of left thigh: considerable gas present in the soft tissues, consistent with gas gangrene (Fig. 2).

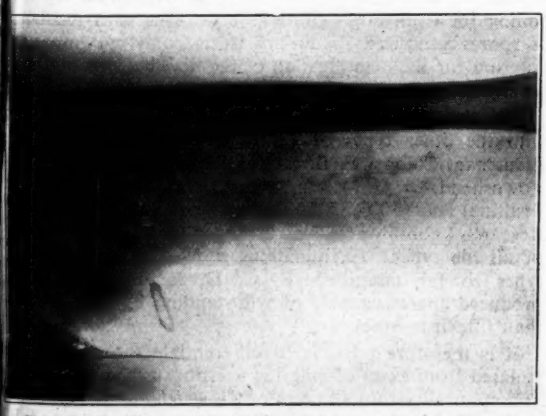

FIG. 2.—Radiograph of thigh showing gas in soft tissues

Post-mortem Examination.—A fungating carcinoma of the descending colon, 2 by 3 cm., was found just below the anterior-superior spine of the ilium. The carcinoma extended three-quarters of the way round the bowel and constricted the lumen but did not occlude it. There was a small stercoral ulcer 1 cm. proximal to the growth. The carcinoma was adherent to the psoas sheath and there was a track from the bowel into the psoas sheath, the contents of which were gangrenous. The superficial tissues over Poupart's ligament were also necrotic. Sections showed an anaplastic spheroidal-cell carcinoma of the colon with a marked trabecular formation. It had eroded through all layers of the gut wall. The muscle showed fragmentation with much oedema and hyaline degeneration. There were numerous clumps of *Cl. welchii* in the spleen. All swabs taken grew *Cl. welchii*.

Summary

An account is given of a patient with carcinoma of the colon presenting as a gas gangrene of the left thigh. The infection had spread from the intestine to the psoas muscle by means of a track connecting the carcinoma to the psoas sheath.

Similar examples of gas gangrene resulting from diseases of the bowel are quoted from the literature.

I am greatly indebted to Mr. W. K. Targett for the surgical treatment of the patient, and to Dr. J. Hewlett and Dr. G. Vincent for the pathological investigations.

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ENTERITIS NECROTICANS DUE TO CLOSTRIDIUM WELCHII TYPE F

BY

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AND

L. RASSFELD-STERNBERG

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In Hamburg on Oct. 8, 1946, Beckermann and Laas gave an account of a number of cases of a severe illness, often fatal, due to a necrotic inflammation of several areas of the intestine, especially in the jejunum. The onset was acute, with very severe pain and slight rigidity, mostly in the left lower abdomen, without obvious guarding. Vomiting and profuse diarrhoea resulted in general dehydration; within a few days extreme circulatory collapse occurred, with general cyanosis. Increased blood urea, low blood chloride, indicanaemia, and indicanuria were often demonstrable. The temperature was slightly raised (up to 38° C.), the blood picture showed a moderate leucocytosis with a marked shift to the left, and the blood sedimentation rate was increased. Surgical and post-mortem examination showed a diffuse sloughing enteritis of the jejunum, ileum, and colon, beginning in the terminal part of the duodenum or the first loop of the jejunum. The most severe lesions were tube-like areas of necrosed mucosa a foot or more in

length. The folds of the mucosa were rigid and thick: large necroses in the upper part of the jejunum were associated with great swelling of the whole inner wall of the intestine. Microscopically the necroses were simple, often extending through the submucosa to the muscle layer, and retained much of the original architecture of the intestine. No significant organisms were recovered from blood, stools, or urine, and no rational therapy could be suggested.

Jeckeln (1947, 1948), in Lübeck, described a similar apparently new disease, called "darmbrand," and suggested that it might be due to a toxin. At the same meeting Ruppert stated that the prognosis was uncertain and the mortality probably 40%. Siegmund (1948) states that the surface of the necrosed mucosa contains many bacteria, especially Gram-positive bacilli.

Heine (1947) refers to very acute cases, one patient dying within twelve hours of the appearance of symptoms. In these he found only redness and swelling of the mucosa, but no necrosis, and is somewhat doubtful that they are cases of enteritis necroticans. As, however, his cases showed oedema of the intestinal wall without leucocytic infiltration it is possible that they were due to bacterial toxins and might be regarded as hyperacute cases of the disease.

Schütz (1948) claimed that the organism responsible for darmbrand was an obligate anaerobe "very closely related to *B. welchii* type A, if not identical with it." Guinea-pigs injected subcutaneously or intramuscularly with cultures of his organisms in Tarozzi broth developed typical gas gangrene. Injection of liquid cultures into the duodenum of guinea-pigs led, especially if alkali was injected at the same time, to oedema of the duodenal wall, necrosis of the mucosa, and even perforations of the lower ileum and caecum. Schütz made no attempt to determine the type of *Cl. welchii* to which his organism belonged. This typing is, however, extremely important, as *Cl. welchii* type A is normally present in the ileum and colon, and may ascend into the upper part of the intestine if other pathological changes occur there. Moreover, the toxins produced by the different types of *Cl. welchii* require entirely different antitoxins to neutralize them, so that any rational therapy must to this extent depend on exact identification.

Lezius (1948), apparently impressed by Schütz's findings, treated his cases with a sulphonamide ("marbadal," a derivative of "marfanil") effective against *Cl. welchii* type A and also with a polyvalent gas-gangrene serum containing *Cl. welchii* α-antitoxin but no β-antitoxin.

Between September, 1946, and January, 1948, we received material from cases of enteritis necroticans from our colleagues (Aschenbrenner, Baniecki, Kuster, Laas, Loeweneck, and Rabl) for bacteriological examination: three loops of intestine removed by operation, specimens of intestine from eight post-mortem cases, and stool from a living patient in whom the diagnosis was well established clinically and by *x*-ray examination. From all these materials an organism closely resembling *Cl. welchii* was isolated.

Morphology

Its rods are rather thicker and usually longer than those of *Cl. welchii* type A, often growing into long filaments and forming clostridia and chains of spindles like *Cl. butyricum* and *Cl. gigas* (*Cl. oedematiens* type B) (Figs. 1–3). In surface colonies swollen forms and clostridia are to be found mainly in rough colonies, whereas the smooth colonies consist almost entirely of smooth single rods, somewhat thicker than those of *Cl. welchii* type A. The rough colonies may closely resemble those of *Cl. oedematiens*; this, however, causes no difficulty in identification, because *Cl. oedematiens* is peritrichous, whereas the organism isolated from cases of enteritis necroticans has no flagella. These morphological differences are, however, not consistent enough for use as discriminants, but the abundant development of rough colonies in surface culture and their marked difference

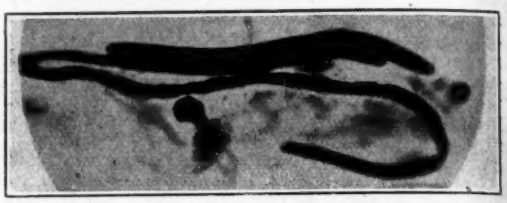

FIG. 1.—*Cl. welchii* type F, elongated forms (×1,500).

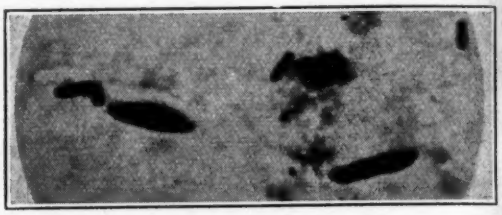

FIG. 2.—*Cl. welchii* type F, clostridial forms (×1,500).

FIG. 3.—*Cl. welchii* type F, chains of spindles (×1,500).

from the normal smooth colony of *Cl. welchii* type A are useful indications of the presence of the new organism (Figs. 4–7).

A decisive difference between the organism isolated from cases of enteritis necroticans and *Cl. welchii* type A is the high thermal resistance of its spores. Though in nature *Cl. welchii* type A forms rather resistant spores (surviving 100° C. up to 90 minutes), spores produced in the usual liver broth or brain pulp seldom resist boiling for more than ten minutes. In comparison all strains of the new organism grown on similar media produced spores resisting boiling for from one to four hours. This high resistance of spores produced in culture is not only an important criterion for the identification of the new bacillus but leads readily to its detection and isolation.

For the opportunity of comparing the new bacillus with the other types of *Cl. welchii* we are indebted to Lieutenant-Colonel F. Buckland, Lieutenant-Colonel R. L. Townshend, Dr. G. M. Findlay, and Dr. S. T. Cowan (Listen Institute) and to Dr. C. L. Oakley (Wellcome Physiological Research Laboratories), who arranged for a supply of strains of all the types. Examinations showed that none of the types so far described—B, C, D, E (Bosworth, 1943)—produced spores capable of withstanding boiling for more than fifteen minutes.

It is therefore possible to differentiate the new bacillus isolated from cases of enteritis necroticans morphologically and culturally from all types of *Cl. welchii* so far described, and we therefore propose for it the name *Cl. welchii* type F

All cultures used in this investigation were separated from other organisms by repeated boiling of sporing cultures and were derived from single cells obtained by micro-manipulation.

Toxicology and Pathogenicity

Toxicology.—As no suitable sera were available in Germany for the discrimination of the types of *Cl. welchii*, eight strains of the new organism were sent to Dr. C. L. Oakley, who reported that they produced traces of *Cl. welchii* α-toxin, considerable quantities of β-toxin, and some γ-toxin. No δ-, ε-, θ, κ-, or λ-toxin was produced. Oakley's findings that the main toxin is β shows that treatment with *Cl. welchii* type A serum would be of no value, as this serum contains no β-antitoxin, and that for any hope of success in treatment serum containing *Cl. welchii* β-antitoxin would be essential.

Pathogenicity.—Intramuscular injection of cultures of *Cl. welchii* type F into guinea-pigs leads to the production of a glassy gelatinous or blood-stained oedema similar to that produced by injection of *Cl. welchii* type B. Death occurs rapidly—something in our experience never seen in other anaerobic infections. Intravenous injection of culture usually led to death in a few minutes. Though feeding *Cl. welchii* type F cultures to guinea-pigs did not cause enteritis, injection of 5 ml. of a one-day-old culture of *Cl. welchii* type F into the lumen of the guinea-pig's intestine led to the development of an enteritis histologically and bacteriologically very similar to that observed in enteritis necroticans in the first days of illness (Professor Haas) and very similar to the enteritis and localized ulceration long known to occur in lambs and foals infected with the lamb-dysentery bacillus, which like *Cl. welchii* type F produces β-toxin. It seems probable, therefore, that the damage to the intestine in enteritis necroticans is due to the β-toxin of *Cl. welchii* type F.

Sensitivity.—*In vitro* tests showed that *Cl. welchii* type F is inhibited by 10 units but not by 1 unit of penicillin per ml.; that it fails to grow in "badional" (sulphanilylthiourea) 1 in 156; that it is remarkably sensitive to "marfanil" (sulphamylon, *U.S.*), "marbadal" (a derivative of marfanil), and "supronal" (a mixture of sulphamerazine and marbadal), which all inhibit its growth at 1 in 10,000; and that sulphadiazine does not affect its growth at all.

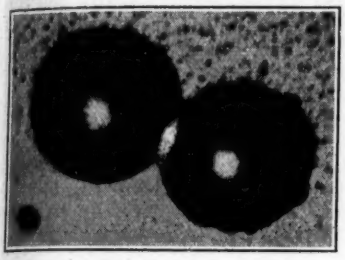

FIG. 4.—*Cl. welchii* type F, one rough, one smooth colony (×25).

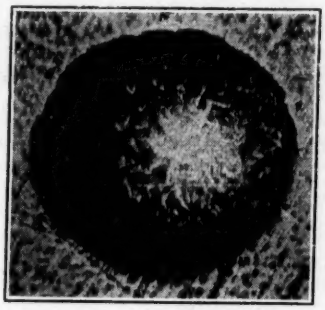

FIG. 5.—*Cl. welchii* type F, mature smooth colony (×25).

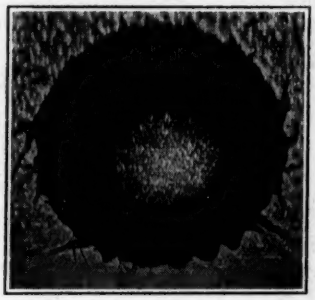

FIG. 6.—*Cl. welchii* type F, rough colony, with characteristic thornlike outgrowths (×25).

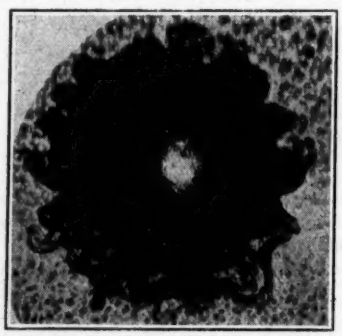

FIG. 7.—*Cl. welchii* type F, rough colony with wavy outgrowths (resembling *Cl. oedematiens* type A) (×25).

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THE TOXINS OF CL. WELCHII TYPE F

BY

C. L. OAKLEY, M.D., B.Sc.

Eight cultures of a type of *Cl. welchii* isolated by Professor Zeissler from cases of enteritis necroticans have so far been examined. They were subcultured into meat broth within 24 hours of arrival, and after appropriate subculture were tested for toxin production by growing them for times varying from 5 to 16 hours in 5-litre quantities of meat broth plus concentrated papain digest of horse meat with a small amount of meat particles; 0.5% sterile glucose was added immediately before inoculation. The cultures were passed through sterile paper pulps to clarify them and finally sterilized by filtration through Seitz filters. In some instances filtrates were precipitated by saturation with ammonium sulphate and the cake so produced dried.

Examination for Toxins (cf. Oakley, 1943)

Lecithovitellin Tests (Macfarlane, Oakley, and Anderson, 1941).—Filtrates from all strains except Z6 and Z8 produced opalescence on incubation for one hour at 37° C. with egg-yolk emulsion; this opalescence could be inhibited by adding to the filtrate *Cl. welchii* α-antitoxin free from other known antitoxins, but was never marked enough to serve as indicator in a full serological investigation.

Haemolytic Tests.—Filtrates from all strains except Z6 and Z8 produced slight haemolysis of sheep red cells. This haemolysis was inhibited by *Cl. welchii* α-antitoxin and, like the opalescence produced in egg-yolk emulsions, is probably due to *Cl. welchii* α-toxin.

Necrotizing Tests.—All filtrates except those from Z6 and Z8 produced a necrotic reaction on intracutaneous injection into guinea-pigs. This reaction is readily inhibited by sera containing *Cl. welchii* β-antitoxin, and serum values can be determined against a standard, using the production of a small area of necrosis (approximately 2 by 2 mm.) as standard indicating effect. Table I shows that sera

TABLE I.—*Serum Values against Cl. welchii Type F Filtrates in Necrotizing Tests to Show Presence of β-toxin*

Serum	Serum Value Against Filtrate from Strain			β-antitoxin Value
	Z2 (NX.597)	Z4 (NX.601)	Z5 (NX.602)	
RR.2364 ..	1,000	1,000	1,000	1,000
RR.2452 ..	1,150	1,200	1,150	1,100
RR.5636 ..	380	450	425	400
RR.6160 ..	400	450	400	400
RR.4547 ..	1,100	1,150	1,100	1,200
RR.4642 ..	1,150	1,150	1,200	1,000
RR.4831 ..	2,000	2,200	1,900	2,100
RR.5993 ..	2,200	2,300	2,400	2,700
RR.4779 ..	2,000	2,200	1,900	2,500
EX.731 ..	95	110	110	100
R.3503 ..	650	675	700	700
R.8819 ..	700	750	800	800
RR.3518 ..	1,700	1,900	1,850	1,900
R.3547 ..	1,850	1,850	1,500	1,500
R.7365 ..	1,350	1,650	1,300	1,300

neutralize the necrotizing activity of these filtrates in proportion to this β-antitoxin content: the necrotic lesion is therefore probably due to β-toxin.

Lethal Tests.—All filtrates (except those from Z6 and Z8) produced rapid death in mice on intravenous injection. The lethal property is completely neutralized by sera containing *Cl. welchii* β-antitoxin, but serum-value tests show that both β- and γ-toxins are present in the filtrates. Thus the majority of sera examined give the same value in lethal tests as in necrotizing tests (Table II), and confirm the presence of β-toxin; a few, however, though giving the β value in necrotizing tests, give a much lower value in lethal tests, suggesting the presence of γ-toxin in the filtrates. No evidence could be obtained in either lethal or necrotizing tests of the presence of ε-toxin.

TABLE II.—*Serum Values against Cl. welchii Type F Filtrates in Lethal Tests to Show Presence of β- and γ-toxins*

Serum	Serum Value Against Filtrate from Strain			β-antitoxin Value
	Z2 (NX.597)	Z4 (NX.601)	Z5 (NX.602)	
RR.2364 ..	1,000	1,000	1,000	1,000
RR.2452 ..	1,100	1,100	1,100	1,100
RR.5636 ..	330	360	360	400
RR.6160 ..	360	400	380	400
RR.4547 ..	1,000	1,100	1,150	1,200
RR.4642 ..	950	1,000	950	1,000
RR.4831 ..	2,300	2,100	2,300	2,100
RR.5993 ..	2,500	2,800	2,800	2,700
RR.4779 ..	2,500	2,200	2,300	2,500
EX.731 ..	85	90	95	100
R.3503 ..	660	750	670	700
R.8819 ..	850	850	800	800
RR.3518 ..	1,900	2,300	2,200	1,900
R.3547 ..	380	550	475	1,500
R.7365 ..	850	650	675	1,350

Tests Using Fresh Guinea-pig Muscle, Collagen-paper, and Azocoll.—No κ- or λ-toxin (Oakley, Warrack, and Warren, unpublished) could be detected in any filtrate by use of these indicators.

Table III shows the toxins so far known to be produced by the various types of *Cl. welchii*. It is clear that the

TABLE III.—*Toxins Produced by Various Types of Cl. welchii*

Type	Toxins										Origin
	α	β	γ	δ	ε	η	θ	ι	κ	λ	
Cl. welchii											
Type A ..	+++	–	–	–	–	(+)	+	–	+	–	Gas gangrene
,, B ..	+	+++	+	±	+	–	+	–	–	+	Lamb dysentery
,, C ..	++	+++	+	++	–	–	+	–	+	–	Struck
,, D ..	+·	–	–	–	++	–	+	–	±	?	Enterotoxaemia
,, E ..	+	–	–	–	–	–	+	+	+	+	? Pathogenic
,, F ..	+	+++	+	–	–	–	–	–	–	–	Enteritis necroticans

present organism does not agree exactly with any type so far described. By the classical methods of Wilsdon (1931, 1932–3) it would be diagnosed as type C, but its failure to produce κ or δ, or to produce much α, or to ferment glycerol to any marked extent is good evidence against this view. It most closely resembles strains of *Cl. welchii* type F that have lost their power to produce ε-toxin; but in view of the high consistency in the strains derived from enteritis necroticans and Zeissler's observation (confirmed in these laboratories) that culture spores of these organisms are much more resistant to heat than those of *Cl. welchii* type B, I consider it reasonable to regard it as a new type—*Cl. welchii* type F.

Antitoxins in Convalescent Sera.—Of six sera examined from persons convalescent from clinical enteritis necroticans three contained about 0.2 unit of *Cl. welchii* β-antitoxin per ml.; the others contained less than this amount. No *Cl. welchii* α- or ε-antitoxin could be demonstrated.

I should like to express my thanks to Miss H. E. Ross and to Mr. H. Proom for subculturing these materials and for supplying me with much useful information; and to thank Miss Ross for providing all the culture filtrates.

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RECOVERY OF CL. WELCHII TYPE F FROM PRESERVED CULTURES

BY

C. DIECKMANN, M.D.

(From the Bacteriological Institute, General Hospital, Hamburg-Altona)

Sixty-three strains identified as *Cl. welchii*, preserved in Professor Zeissler's collection of anaerobes, were inoculated into liver broth; from the growth five test-tubes containing brain pulp were inoculated. After two days' incubation in Zeissler's anaerobic jar at 37° C. and three days' at room temperature the test-tubes were boiled in Koch's steam pot at 100° C. for 5, 60, 120, 180, and 240 minutes and cooled immediately in cold water. From the material so treated 0.5 ml. was transferred to test-tubes containing liver broth and incubated in the anaerobic jar for two days at 37° C.

Of the 63 strains tested only two survived boiling for as long as 5 minutes—one survived 120 and the other 180 minutes. Both had the characters of *Cl. welchii* type F. Both were recovered from war wounds of German soldiers on the Russian front in 1943; one (Ru 62) was the only pathogenic organism recovered; the other (Ru 72) was associated with *Cl. sordellii*, *Cl. oedematiens maligni gracilis*, *Cl. tetani*, and *Cl. putrificus verrucosus*.

ORIGIN OF CL. WELCHII TYPE F INFECTION

BY

E. HAIN, M.D.

(From the Bacteriological Institute, General Hospital, Hamburg-Altona)

The following case throws some light on the origin of *Cl. welchii* type F infection in man.

Case Report

A man aged 71, never ill previously but with a rather poor digestion for the last few years, ate with some friends a meal consisting of tinned rabbit, tinned fat giblets, and green cabbage. A few hours later he fell ill with abdominal discomfort and frequent vomiting; later he developed abdominal pain, and during the night passed about twenty watery stools. Increasing exhaustion and low blood pressure developed, and he was admitted to hospital next morning.

His notes state that he was a well-developed rather fat man, apathetic, weak-looking, pale, with some cyanosis of his extremities; his pulse was scarcely perceptible, his blood pressure very low. His abdomen was slightly distended; he felt no pain, but was tender in the right epigastrium. His temperature was 39° C. His blood picture showed a polymorphonuclear leucocytosis with a marked shift to the left; the blood sedimentation rate was increased. Electrocardiography revealed evidence of recent cardiac infarction.

Passage of frequent blood-stained watery stools led to further dehydration and impairment of the circulation; restoratory measures and treatment with "resulfon" had no effect; surgical treatment was considered hopeless. The patient died about 60 hours after the onset of the symptoms.

At necropsy the clinical diagnosis of enteritis necroticans was confirmed; there was a necrotic inflammation of the jejunum, most marked in its upper part and decreasing in severity along its length. Several smaller ulcers were present in the ileum and rectum.

Two persons who shared the meal with the patient fell ill soon after it with slight sickness, and one passed a single watery stool. Both recovered in twenty-four hours without calling in a doctor.

Bacteriological Examination.—Full bacteriological examinations were made of the remnants of food left from the meal, of stools from the patient and from those who had shared the meal with him, and of the contents of a loop of the patient's intestine obtained post mortem. The green cabbage and stool from one of the friends yielded no significant pathogen; from all the other samples *Cl. welchii* type F was readily isolated by the following technique.

(1) *Stool.*—Samples of stool the size of a pea were placed in test-tubes containing sterile broth and boiled at 100° C. in in a steam-pot for 60 minutes. This acted as a first screen for selecting organisms with resistant spores. About one-fifth of the boiled material was inoculated with liver broth and both tubes were incubated in the anaerobic jar for 16 hours at 37° C. If no growth occurred in the liver broth it was reinoculated from the broth tube.

(2) *Other Materials.*—These were inoculated into 100–500 ml. of brain pulp and incubated for three to five days. From this material 0.5 ml. was inoculated into fresh brain pulp and the five tubes so inoculated were boiled for 60, 90, 120, 180, and 240 minutes.

Then by repeated subculture from liquid to solid media, and from solid to liquid, with frequent boiling of sporing cultures, pure cultures were obtained and tested for action on gelatin, sugars, and alcohols, and for pathogenicity to guinea-pigs.

Comment

The food used in the meal had been prepared from home-bred rabbits butchered about three weeks before and tinned immediately. The tins were closed and boiled for two hours in a water bath. When the tins were opened and the meat prepared for food three weeks later it appeared wholesome in appearance and odour. Notwithstanding this, three persons who ate it sickened; one of these died, and from the stools of two of them and from the meat *Cl. welchii* type F was recovered. It is clear that the usual method of sterilizing meat by boiling for two hours will not suffice if it is contaminated with this organism.

I have to thank Dr. Aschenbrenner for the clinical notes and Dr. Baniecki for the post-mortem record.

ON THE OCCURRENCE OF CL. WELCHII TYPE F IN NORMAL STOOLS

BY

E. HAIN, M.D.

In an investigation on the occurrence of *Cl. welchii* type F in the normal intestine, 108 stools derived from persons not suffering from enteritis necroticans were examined for the presence of this organism. The results are shown in Tables IV and V.

As the patients were a reasonable cross-section of the inhabitants of Hamburg, I feel that the figures show that about one-sixth of the normal persons in Hamburg during the winter of 1947–8 carried *Cl. welchii* type F in their stools. The strains recovered are, however, much less pathogenic for animals than those isolated from cases of enteritis necroticans. Most of the guinea-pigs who received injections into the thigh of pure cultures of the organisms from normal stools would have recovered without treatment had they not been killed on the second or fourth day after injection.

TABLE IV.—*Proportion of Cases in which Cl. welchii Type F was Recovered from Stools, Arranged According to Age and Sex of the Patients*

	Men				Women			
Age:	0–14	15–50	>50	Total	0–14	15–50	>50	Total
No. of samples ..	13	27	10	50	14	34	10	58
Cl. welchii type F:								
Present	2	3	2	7	2	9	1	12
Absent	11	24	8	43	12	25	9	46

TABLE V.—*Results Arranged According to the Origin of Stools Yielding Cl. welchii Type F on Culture*

Cl. welchii Type F	Origin of Material					
	Cases of Typhoid and Paratyphoid Fever	Cases of Diarrhoea and Dyspepsia Suspected of Typhoid, Paratyphoid, or Dysentery	Cases of Surgical and Skin Diseases	Cases of Internal Disease	Personnel of Camp Kitchen	Total
Positive ..	2	2	3	9	3	19
Negative ..	11	11	18	47	2	89
Total ..	13	13	21	56	5	108

The pathological changes produced in the injected animals (glassy gelatinous oedema of the subcutaneous tissues) were qualitatively similar to those produced by the more virulent strains but far less severe.

Further research will be necessary before it is possible to show whether carriers are of any importance in the epidemiology of enteritis necroticans.

Medical Memoranda

Cl. welchii Infection of the Eye

Panophthalmitis caused by *Clostridium welchii* is a rare condition, and the following case is presented for addition to the literature. Walker (1938) reviewed twelve cases, and in 1946 Capus reported on one.

CASE HISTORY

An apprentice plumber aged 15 sustained an injury to his right eye at 2.30 p.m. on Sept. 27, 1948, while using a steel chisel on a brick wall. A fragment of the metal broke off and became lodged in his eye. He was taken to the local hospital, where removal of the foreign body was attempted without success. Penicillin, 200,000 units, was given approximately two and a half hours after the injury was received. He was transferred to the Aberdeen Royal Infirmary, arriving there about 2.30 a.m. on the 28th. On admission he was examined and given 300,000 units of penicillin, this being repeated three-hourly.

Examination revealed the following: the pupil of the right eye was very small; the iris pattern was indistinct and the anterior chamber shallow; an incision of the cornea had been made running from 6 to 9 o'clock, and there was a wedge-shaped foreign body lying about 8 to 9 o'clock, with some bleeding beside it; no red reflex was seen. At 9 a.m. he was re-examined. The cornea was found to be bright and there was no obvious sign of infection. The foreign body appeared to be lying about 10 mm. behind the cornea. Twelve hours later the eye was septic and proptosed, so that enucleation became necessary. This was carried out by Dr. J. Mutch. During the operation gas and blood-stained pus escaped freely. Afterwards the socket was dusted with penicillin. When the eyeball was examined it was found to be distended with gas and pus. There was retinal detachment.

Post-operative recovery was rapid and the patient was discharged on Oct. 11 with a clean, well-healed socket.

Bacteriological Investigation.—The contents of the eyeball showed pus cells, diphtheroids, and Gram-positive rods. A loopful of pus was inoculated into Robertson's meat broth and litmus milk. A typical "stormy fermentation" reaction was obtained from the latter. A subculture plated on horse-blood agar and incubated anaerobically for 48 hours gave a heavy pure growth of *Cl. welchii*. The colonies were haemolytic. The Nagler reaction was positive. A broth culture filtrate made from the plated colonies was lethal to mice, 0.2 ml. of an 18-hour culture causing them to die within three to four hours.

COMMENTARY

Apart from the rarity of this type of case, it is interesting that panophthalmitis should ensue in spite of the early administration of penicillin in large amounts. It has been shown experimentally (von Sallmann, 1944) in rabbits that before a panophthalmitis can be produced *Cl. welchii* has to be introduced into either the lens or the vitreous, and as penicillin fails to diffuse into the latter in any appreciable quantity this would probably account for its failure to arrest infection in this case.

I am much indebted to Drs. Law and Mutch for permission to use their case notes.

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Dislocation of Hip-joint at "Rugger"

Dislocation of the hip is uncommon even in rough games, and occurs only as a result of great violence. It is seen in young people whose femur is strong and resilient enough to escape fracture of the neck. Nevertheless, in the course of twenty years of a busy undergraduate practice between the wars, among the many college and university players at Cambridge no case had been encountered at rugby football until the one now reported.

CASE HISTORY

On Jan. 29, 1948, I was called to a college ground where the captain of the home side was lying in agony, in drenching rain, while two friends held his right lower limb with the hip and knee joints flexed, and the thigh adducted, as requested by the patient. The slightest movement provoked cries of pain. Morphine was given at once. A brief examination indicated a diagnosis of dislocation of the hip-joint, and, not without difficulty and anguish, the patient was placed in the waiting ambulance, his friends maintaining their attendance during the journey to the local nursing-home.

Reduction.—He was anaesthetized immediately with thiopentone, and the diagnosis of dorsal dislocation was confirmed. We were prepared for a long pull in a very muscular ex-Service man, but trial was first made of simple manipulation. The hip and knee were flexed, followed by simple movements of rotation while in this position. The head of the femur suddenly slipped easily back with a click into the acetabulum, and full movements were at once restored.

In view of the rarity of this accident at rugger, it is of interest to see how it happened.

Patient's Story.—The patient, a hefty centre three-quarter, stated that the ground was very wet, making swerving and even running at speed very difficult. "I had the ball and was running at medium pace, when a wing-forward tackled me from behind. I resisted the tackle, which stopped my forward momentum. As I continued to resist, the pressure was downwards and backwards, with my knees bent, and the strain taken in my hips. Gradually my legs bent wider and I fell sitting as they shot out in front. I think the joint was 'out' then—I certainly felt a great deal of pain—but as I sat down a second opponent kicked and swung the right leg across to the left. My leg remained sticking up in the air, held up by my own hand and subsequently by others. Any movement was agonizing."

From the above account it would seem that, with the feet everted to try to retain a grip on the slippery ground, the limbs were steadily forced into flexion while in a position of wide adduction, until the head of the femur became dislocated on to the dorsum ilii. The subsequent kick, swinging from without inwards, would merely serve to aggravate the displacement and to accentuate the pain.

Massage and infra-red rays were given daily at first. On the sixth day the patient got up on crutches and was bearing some weight but he had pain on "swivelling." He returned to his rooms in college that day. On the seventh day he went up and down a flight of stairs to the w.c. On the tenth day he walked 1½ miles (2.4 km.) and next day he rode a bicycle. After two months he played golf, tennis, and squash. Recovery was uneventful.

R. SALISBURY WOODS, M.D., F.R.C.S.

Diphtheritic Vaginitis

The following report of a case of leucorrhoea due to an infection by the Klebs-Loeffler bacillus is worth recording because of its rarity.

CASE HISTORY

A married woman aged 33 was referred to the gynaecological outpatients department because of increasing leucorrhoea. This had been present in a minor degree for about a year, but during the past month had become profuse and offensive. Stovarsol pessaries, prescribed by her doctor, had had little if any effect. She had had one pregnancy three years previously, which was terminated after a long labour by an incision of the cervix and a forceps delivery. Menstruation was regular. Her general health was excellent and she had had no serious illnesses in the past. No history of contact with a diphtheritic case could be obtained.

Examination of the vagina revealed a profuse watery dirty-coloured discharge, which had the odour encountered in the breath of patients suffering from faucial diphtheria. After cleansing the vagina by dry swabbing, the cervix was seen to be covered by large superficial discrete ulcers, the surface consisting of a greyish exudate which was adherent and could be removed only in small portions by very firm swabbing, leaving a raw bleeding area. The whole vagina was reddened and inflamed, and the upper two-thirds contained numerous pin-head ulcers. Examination did not cause undue discomfort. Specimens of the discharge sent for laboratory investigation revealed the presence of a pathogenic strain of the diphtheria bacillus.

The patient was transferred to the isolation hospital, where she was given a single intramuscular dose of 40,000 units of antidiphtheritic serum, and penicillin 100,000 units twice daily for three days. This treatment caused an almost immediate improvement of the vaginitis, discharge being absent after one week. Three further specimens from the vagina, at weekly intervals, gave negative results for the diphtheria bacillus. Examination of the vagina and cervix one month after she was first seen showed a normal mucous membrane with no sign of the previous ulceration.

COMMENT

Diphtheritic infection of the vagina is rare, but if it occurs it presents a clinical picture which is so typical that it can cause no difficulties in diagnosis, provided the possibility of such an infection is borne in mind.

I wish to thank Mr. H. A. Hamilton, gynaecologist, Gloucestershire Royal Infirmary, for permission to describe this case.

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Reviews

PROBLEMS OF FERTILITY

Problems of Fertility in General Practice. By Margaret Hadley Jackson, M.B., B.S., D.R.C.O.G., Joan Malleson, M.B., B.S., John Stallworthy, F.R.C.S., M.R.C.O.G., Kenneth Walker, M.B., F.R.C.S. With foreword by Sir Eardley Holland, M.D., F.R.C.S., F.R.C.P., F.R.C.O.G. (Pp. 255; illustrated. 17s. 6d.) London: Hamish Hamilton Medical Books. 1948.

In the *British Medical Journal* of Feb. 14, 1948 (p. 294), under the heading "What the Medical Practitioner Wants to Know," Dr. R. T. Bevan analysed the 2,018 subjects which appeared in the "Any Questions?" column during the years 1943–6. He drew attention to the fact that in addition to those which were classified as gynaecological a large proportion of the questions were concerned with sex problems, implying that this aspect of medicine is not only inadequately taught in our medical schools but one on which it is not easy to obtain information from the books ordinarily found in a doctor's library. The remedy is now at hand in this volume published under the auspices of the Family Planning Association, and it is safe to say that most of the questions would never have been sent had this book been available to the inquirers.

Its individuality and its attractiveness depend in large measure on its wide, although essentially practical, view of human fertility. Thus it includes discussion of normal and subnormal fertility, abortion, contraception, and a small section on eugenics. The references to some of the most difficult clinical problems such as impotence, frigidity, premarital examination, artificial insemination, and eugenic sterilization are particularly helpful. There are, too, some useful hints on the terms which may be used when discussing these intimate matters with patients. The authors describe in admirable detail those procedures which can be regarded as coming within the province of the general practitioner, and say enough of the others to enable the family doctor to interpret, and to assess the value of, the results of investigations carried out by a consultant. Moreover, it would appear that great care has been taken to keep the account reasonable and free from those extravagant and unscientific claims which so often mar writings on these subjects. So much is this true that it is surprising that the description of the traditional treatment of threatened and habitual abortion with progesterone is not qualified in the way which recent work would appear to demand. It might also be remarked that it is questionable whether oestrogens merit a place in the treatment of trichomonas vaginitis in women whose ovarian function is normal; this is particularly true in cases of infertility, because the dose recommended is one which, according to another chapter, is sufficient to suppress ovulation. By and large, however, the authors are to be congratulated on a most interesting as well as informative work, which will undoubtedly have a wide appeal.

T. N. A. JEFFCOATE.

HERNIA

Hernia. Anatomy, Etiology, Symptoms, Diagnosis, Differential Diagnosis, Prognosis and Treatment. By Leigh F. Watson, M.D., F.I.C.S. Third edition, enlarged and thoroughly revised. (Pp. 732; 323 illustrations by Helen Lorraine, Willard C. Shepard, Ralph Sweet. £3 7s. 6d.) London: Henry Kimpton. 1948.

A comprehensive monograph such as Leigh Watson's, which is now in its third edition, is useful because there is so much divergence of opinion about the most suitable operation for each variety of hernia and because the methods used by surgeons of experience for the radical cure of hernia differ so considerably. This was brought out at a meeting of Service and E.M.S. consultants during the recent war. While for inguinal hernia one advocated the Bassini operation even in a young child, others prefefred in young subjects to remove the sac and disturb the inguinal canal as little as possible, and in cases in which there was an agreed indication to reinforce the canal the methods practised were many and diverse. Such experience should be enough to convince anyone of the difficulty of standardizing surgical practice and the need from time to time to review it in detail.

This edition is much better than the two which preceded it, and we are pleased to note that certain suggestions made in our review of the second edition have been adopted, notably the addition of an index of authors and a reduction of the space devoted to describing injection treatment. The account of this treatment is in better perspective in this edition; it has but a small place—some surgeons might deny it even this—in surgery to-day. We might hazard an opinion that in future editions even less space will be given to discussing sclerosing therapy than the 70-odd pages still allotted to it. Lateral anastomosis (p. 81) is not often a good procedure, and end-to-end junction should in our opinion be performed by suturing and be given pride of place over all forms of anastomosis. Is Moynihan's absorbable bobbin still popular, as stated on page 79? It is certainly not in Britain; and the Murphy button illustrated a little further on is surely only of interest as evidence of the ingenuity of its inventor and because of its place in the history of intestinal anastomosis.

The author describes well the rarer varieties of hernia such as the obturator, lumbar, and perineal types, and the illustrations, which are all good, are plentiful throughout, as are the historical references. We should like to have seen Parry of Glasgow's name mentioned in association with Lotheissen of Vienna in connexion with the repair of femoral hernia by the inguinal canal route. The author might also have referred more to Halsted's important papers, which give a clear description of his operation for inguinal hernia by transplantation of the cord; after complete extirpation of the sac the canal is closed in by a double-breasted overlap of the external oblique behind the transplanted and now superficial cord. This operation has all the advantages of the fascial suturing procedures and is applicable to both the oblique and direct varieties of inguinal hernia. The many methods described may confuse the young surgeon, but they will probably be fascinating reading to the more experienced practitioner, serving to remind him how from time to time what are apparently innovations are in reality a reintroduction of methods which have previously been described, adopted for a time, and abandoned. Such may be said for most of the flap types of reinforcement in which pieces of rectus sheath or fascia lata are turned out of their normal position to reinforce the canal. Dr. Watson begins the first chapter with a quotation from Galen, "No great and perfect work is ever accomplished as a single effort, or receives its final polish from one instrument"—a salutary observation which may well be applicable to the various editions of this book, of which the present one is by a wide margin the best yet.

LAMBERT ROGERS.

OPERATIVE GYNAECOLOGY

Operative Gynecology. By Harry Sturgeon Crossen, M.D., and Robert James Crossen, M.D. Sixth edition, entirely reset and revised. (Pp. 999; 1,334 illustrations, including 30 in colour. £3 15s.) London: Henry Kimpton. 1948.

The last edition of this book was published in 1938, and the new edition will be very welcome, for textbooks of gynaecological surgery are relatively few. The criticisms of the previous editions were directed in the main towards the length of the book and what some regarded as unnecessary details about relatively unimportant operations. The illustrations were always admired and the subject matter was clearly expressed and fairly easy to follow.

In the new edition much of what was regarded as redundant has been removed. The book is now of a convenient size, and taken as a whole it can be regarded as the leading textbook of gynaecological surgery in the English tongue. It is easy to find minor faults in a book of 900 pages. The arrangement of the subject matter is not altogether satisfactory, for much of the last 150 pages could have been introduced at the beginning, and perhaps the authors might have paid less attention to conditions which are not strictly gynaecological. On the other hand, their account of the methods of dealing with injury to the ureter is admirable and in excellent detail. They are clearly worried by the high frequency of malignant disease

of the female genital tract and pay much attention to the practical means of preventing it. Furthermore, they discuss the methods of treating carcinoma of the uterus almost at the beginning of the book. A point of some interest is that they do not seem to have such great enthusiasm for using drugs of the sulphonamide group as is customary in Britain.

The book will be generally welcomed, for it gives a full account of gynaecological surgery, and the manner in which the subject is presented is vigorous and stimulating.

WILFRED SHAW.

MEDICINE FOR NURSES

Introduction to Medical Science. By Gulli Lindh Muller, M.D., and Dorothy E. Dawes, R.N., M.A. Second edition. (Pp. 580; illustrated. 20s.) Philadelphia and London: W. B. Saunders Company. 1948.

The authors of this book, a pathologist and a nurse, provide in comparatively small space a comprehensive outline of pathology, clinical pathology, and public health for nurses. A historical introduction leads on to a systematic account of modern medical science. Sections on the causes of disease and the bodily changes they induce are followed by an account of how diseases may be diagnosed and treated. The last section is on their prevention. The authors omit little. For example, in sixteen pages on the pathology of tumours they describe some thirty different types of neoplasm, with six illustrations. In five pages on renal-function tests they find room to describe the principles and techniques of the concentration and dilution, the dye-excretion, and the various clearance tests, including those with inulin and diodrast. They mention the more important wartime advances in medicine, including even the uses of plasma fractions and parenteral amino-acid therapy.

So much detailed and up-to-date information compressed into so short a space makes the book rather dull reading, and the young student nurse for whom it is intended would find it difficult to see the wood for the trees. The book is "to serve as an overview of medical science prior to her services on the wards," but the order of the exposition, though logical, would probably make the book unintelligible to anyone without clinical experience. The first chapter is no easier than the last, and to guide the student through the many new concepts and unfamiliar terms there is only a glossary to help her. Even this may fail her, as in, for example: "Atopy, Condition of being sensitive to an atopen or a substance to which an allergic person is sensitive"; or "Gonadotropic hormone, Hormone of the sex glands." The style, which is careless and inelegant, increases the difficulty of understanding the text.

Only a physiological approach can make modern medicine intelligible to the novice, and there is need for an introductory book in which disease states and their natural histories are interpreted in terms of disordered structure and function. The authors of this work do not attempt this. Its use in Britain will be chiefly as a book of reference for ward sisters and others responsible for teaching nurses. In America it presumably caters for a syllabus that our nursing curriculum fortunately does not include.

L. P. R. FOURMAN.

In *An Approach to Social Medicine* (Baillière, Tindall and Cox; 15s.) Dr. John D. Kershaw discusses the development of a particular attitude towards medicine and society. While every good practitioner is actively concerned with the development of medicine in relation to social life, too few have accepted the challenge that medicine (among other agencies) must actively influence social activities in the interests of human well-being. Dr. Kershaw reviews the structure of society in order to evaluate its disorders and then discusses the relation of the major branches of medicine to social activities. Finally he considers some of the health problems created by society. Social medicine is a philosophy of health, and in the last chapter he deals appropriately with the human and social instruments of that philosophy. This practical work is recommended both to medical men and to those who claim to be intelligent responsible citizens; it is to this audience that the author appeals. Succinct and necessarily dogmatic, it will interest many readers, and for the more inquiring there is an excellent bibliography.

BOOKS RECEIVED

[Review is not precluded by notice here of books recently received]

Les Entretiens de Bichat 1948: Chirurgie - Spécialités. Edited by Dr. Petit-Dutaillis. (Pp. 374. 800 francs.) Paris: L'Expansion Scientifique. 1948.

Short articles on a wide variety of surgical topics, including ophthalmology and gynaecology.

Les Entretiens de Bichat 1948: Médecine. Edited by G. Laroche and L. Justin-Besançon. (Pp. 390. 800 francs.) Paris: L'Expansion Scientifique. 1948.

Short articles on many aspects of clinical medicine.

Sexualhormontherapie. By E. Tscherne. (Pp. 231. 75 Sch.) Vienna: Wilhelm Maudrich. 1948.

A monograph on the physiology and therapeutic uses of sex hormones.

Diseases of the Nose and Throat. By the late Sir St.Clair Thomson and V. E. Negus, M.S., F.R.C.S. 5th ed. (Pp. 1004. 70s.) London: Cassell. 1948.

This edition includes new material on inflammatory complications and their treatment by chemotherapy and antibiotics.

Les Diastases. By P. Fleury and J. Courtois. (Pp. 216. 150 francs.) Paris: Armand Colin. 1948.

An introduction for students and non-specialists.

Marriage Counselling. By D. R. Mace, M.A., B.Sc., Ph.D. (Pp. 167. 8s.) London: J. and A. Churchill. 1948.

An account of the work done by marriage guidance councils.

Péan. By R. Didier. (Pp. 242 800 francs.) Paris: Maloine. 1948.

A biographical study of the French surgeon.

Techniques in Physiotherapy. Edited by F. L. Greenhill, S.R.N., M.C.S.P., T.H.T., and others. (Pp. 222. 12s. 6d.) London: Hodder and Stoughton. 1948.

Intended for the practising physiotherapist.

La Dénutrition de Guerre. By E. F. Simonart. (Pp. 262. No price.) Paris: Maloine. 1948.

A study of the effects of starvation in Belgium during the war.

A Textbook of Biochemistry. By R. J. Williams, Ph.D., D.Sc. 2nd ed. (Pp. 533. 25s.) London: Macmillan. 1948.

Intended specially for medical students.

Measurements of the Public Health. By F. A. E. Crew, M.D., D.Sc., Ph.D., F.R.C.P.Ed., F.R.S. (Pp. 243. 18s.) London: Oliver and Boyd. 1948.

Essays on such topics as population, illegitimacy, the sex ratio, marriage, and the biology of death.

Annual Review of Microbiology. Edited by C. E. Clifton, and others. Vol. 2. (Pp. 532. 36s.) London: H. K. Lewis. 1948.

Includes reviews of the nature of antibodies, the metabolism of malaria parasites, and the pathogenic streptococci.

Der praktische Arzt und die Tuberkulose. By H. Ulrici. (Pp. 165. M.7.50.) Berlin: Springer. 1948.

A guide to tuberculosis for the general practitioner.

The Medical Clinics of North America. (Pp. 288. No price.) London: W. B. Saunders. 1948.

A symposium on recent advances in gynaecology and obstetrics.

The Trent and I Go Wandering By. By R. G. Hogarth, C.B.E., D.L., J.P., F.R.C.S., Hon. LL.D.Ed. (Pp. 144. 12s. 6d.) Nottingham: Cooke and Vowles. 1948.

Stories of over 50 years of the author's life in Nottingham. Mr. Hogarth is a Past President of the British Medical Association.

Contributions to Psycho-Analysis, 1921-1945. By M. Klein. (Pp. 416. 21s.) London: Hogarth. 1948.

Papers on psycho-analysis reprinted, with one exception, from journals.

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N.H.S. ACT IN AUSTRALIA

The medical profession in Australia, under the guidance of the Federal Council of the B.M.A., is taking a firm stand against the scheme for a National Health Service outlined in the Enabling Act passed by the Federal Parliament at the end of last year. The Act, a full account of the debate on it in the Australian Parliament, and a leading article giving details of the negotiations between the B.M.A. in Australia and the Government are published in the *Medical Journal of Australia* for Feb. 5. A summary of the main points in the dispute appears in this week's *Supplement*. The attitude of the Government to our Australian colleagues is expressed in forcible terms in a letter from Senator N. E. McKenna, Minister for Health and Social Service, to Sir Henry Newland, President of the Federal Council of the B.M.A. in Australasia, thus:

"It [the Government] has regretfully come to the conclusion that, despite the splendid services rendered by the great number of practitioners, your Association is grievously lacking in a sense of social responsibility.

"Having exhausted every endeavour to secure the co-operation of your Association, the Government does not intend that its proposals should be further delayed or frustrated by your Council or Association.

"I have to convey to you the decision of the Government that, within the limits of constitutional power, it will proceed to put its plans into operation."

Commenting on this, the leading article in the *Medical Journal of Australia* observes that "the Government of the Commonwealth of Australia is determined to force on the people a piece of legislation which is foredoomed to failure."

Proposals for a complete medical service for Australia were considered by the Federal Council in 1940, and after these had been looked into by the Branches the proposals, modified in some respects, were adopted in 1941. The B.M.A. scheme advocated the provision for every individual of the services of a general practitioner of his own choice, and of consultant and specialist and laboratory services and of institutional treatment all to be available normally through the agency of the family doctor. It also recommended the co-ordination of the several parts of a complete medical service by the application of a planned national health policy, and the direction of the medical service to the achievement of positive health and the prevention of disease no less than to the relief of sickness.

Towards the end of 1941 the National Health and Medical Research Council put forward its views in a document entitled "Outline of a Possible Scheme for a Salaried Medical Service." The Federal Council, taking notice of this, laid down its policy in more detail in 1943, and in May, 1944, adopted the fee-for-service principle "as one acceptable substitute for any unacceptable scheme proposed by the Government." In June, 1944, the Federal Minister for Health and Social Service declared the Government's intention to introduce a service which would be free of cost to the citizen except through "such general contribution as may be made through general revenue channels." At the same time the Treasurer, who is now Prime Minister, observed that the Government would have at its disposal after the war "a considerable number of medical graduates . . . pledged to give their services to the Commonwealth Government for a period of years." The B.M.A. in Australia interpreted the Government's intention as being one to introduce a salaried medical service and declared its opposition to this. In May, 1946, the Minister for Health informed the Federal Council that the Government's policy was to make available to every person in Australia medical attention without any direct charge for the service, and to include in the scheme "the full range of medical attention, including all modern diagnosis and specialist services." In 1947 the Federal Council drew up principles which in its view should govern a national medical service, and included in these seven of the principles drawn up by the Council of the B.M.A. in Britain. The Federal Council advocated the payment on a fee-for-service basis of practitioners and of consultants and specialists in a national medical service, and suggested that "the role of a government in hospital administration should be one of co-ordination only, leaving the control to independent boards of qualified persons." In July, 1947, the Minister for Health stated in a conference between him and the Federal Council that the Government's aim was to abolish private medical practice.

The Federal Council was prepared to negotiate with the Government provided it did not reject the following principles: (1) control to be vested in a corporate body; (2) no contract between the Government and individual practising doctors; (3) payment on a fee-for-service basis. The Federal Council proposed that, under the direction of the Minister and at a level with the Director-General of Health, there should be a controlling body predominantly medical and representative of the practising profession, the medical representatives to be the direct nominees of the profession. The Council did not admit the right of the Government to fix a fee of which it paid only a part, and demanded that a scale of benefits should be laid down. It held also that no regulations should be brought out under the Act unless first approved by the controlling body. Medical practitioners, in the view of the Federal Council, would be unwilling to undertake the necessary clerical work or incur the liabilities of acting as the agent for the patient obtaining medical benefits. The Government proposed that the patient should pay half the doctor's fee and the other half should be obtained by the doctor on application to the Government: the Federal Council objected that this would oblige the practitioner to make available to a departmental officer his clinical records and thus destroy the confidential relationship between doctor and patient. It opposes the Act (1) because control will be under the Director-General of Health and not under a corporate body; (2) because of the wide powers of the Minister in making regulations; (3) because of its objection to experimental health centres under the control of the Government; (4) because of the Government's proposals for remunerating doctors. The essential basis of the opposition of the Australian medical profession is its belief that the Government's ultimate aim is the abolition of private practice.

The *Medical Journal of Australia* points out that the Pharmaceutical Benefits Act was brought to naught by the

refusal of the profession to co-operate with the Government, and implies that the same fate awaits the National Health Service Act if the Australian Government rejects the principles which our Australian colleagues are prepared to take as the basis for a complete medical service for the people of Australia. The stage is set for an acute conflict, which will be watched with interest and sympathy by the medical profession in this country.

ENTERITIS NECROTICANS

The *Clostridia*, sporogenous anaerobes found in variety and great profusion in soil and dirt generally as well as in the lower intestinal tract of man and animals, are among the most versatile of bacteria. They play a leading part in many forms of natural decomposition, particularly that of animal carcasses. Among their purely beneficent activities two species, *Cl. pectinovorum* and *Cl. acetobutylicum*, are responsible for valuable fermentative processes, the retting of flax and other vegetable fibres and the production of acetone and butyl alcohol from maize or molasses. On the other hand they are responsible for three distinct and very different diseases in man—tetanus, gas gangrene, and botulism—and for many animal diseases. Some of the latter—blackleg, black disease, and pulpy kidney—resemble human gas gangrene in their nature though not in their apparent origin, since the traumatic factor is absent. In others—lamb dysentery, struck, and braxy—the primary lesion is in the alimentary tract, a condition which has hitherto had no recognized counterpart in human pathology.

We publish in this issue a series of papers showing that an acute and often fatal intestinal infection, due to a *Clostridium* and having close affinities with these animal diseases, can occur in man. In the first paper Professor J. Zeissler and Miss L. Rassfeld-Sternberg, of Hamburg, give an account of its occurrence in various places in Germany during the past three years. The essential lesion is an extensive necrosis of the mucosa of the small intestine, particularly in its upper part, but sometimes extending into the colon, and though nothing characteristic is discoverable in the faeces examination of the lesions themselves shows the presence of numerous Gram-positive bacilli. These have been cultivated by various observers, and the contribution of Zeissler and Rassfeld-Sternberg to this study is an examination of the characters of some of the strains isolated by themselves from eight cases of the disease, which has now been named enteritis necroticans. The organism had previously been identified as *Cl. welchii* and believed or assumed to be of type A, which is the type causing gas gangrene in man. They found several points of difference: the individual rod is somewhat larger, the colonies are rough instead of glistening, and the heat resistance of the spores is considerably greater. *Cl. welchii* is among the least heat-resistant of sporogenous bacteria: spores formed in culture do not resist boiling for more than a few minutes. Those of the new organism withstood boiling for from one to four hours, a fact which provided not only a criterion of identity but a satisfactory method of isolation. Cultures not only brought on fatal infection in animals when injected parenterally, but when introduced into the guinea-pig's intestine caused the intestinal lesions seen in man.

The story is here taken over by Dr. C. L. Oakley, whose study of the toxins of *Cl. welchii*, begun in connexion with work on gas gangrene during the war, has since been pursued with fruitful results. It appears that only six of the eight strains behaved consistently, but the characters of these are unmistakable. They form comparatively little of the α-toxin, the main toxin of type A, causing human gas gangrene; their main product is β-toxin, and this is quantitatively neutralized by *Cl. welchii* β-antitoxin. This is the principal toxin formed by the type B organism responsible for lamb dysentery, and human enteritis necroticans must therefore be regarded as having very close affinities with this disease. On the other hand the organisms are not identical, and Oakley regards both the failure of the new strains to produce subsidiary type B toxins, recently identified by himself, and their remarkable heat resistance as entitling them to recognition as a separate type, now to be designated F.

Three further papers throw some light on this organism from other points of view. Dr. C. Dieckmann has examined 63 preserved cultures of *Cl. welchii* and found only two of type F: these were derived from the wounds of soldiers serving on the Russian front. Dr. E. Hain has found that type F is recoverable from a small proportion of miscellaneous samples of human faeces. This need occasion no surprise, especially since these strains were of low pathogenicity. Wide variations in the capacity to produce toxin account in part for the contrast between the extensive distribution of such organisms as this and the comparative rarity of the dangerous infections caused by them. (An example of the exceptional case is reported by Dr. A. L. Wyman in this issue: gas gangrene of the thigh was found to be due to an endogenous *Cl. welchii* infection spreading from a carcinoma of colon.) In another paper Dr. Hain describes a case of enteritis necroticans in which the source of infection was clearly identified as home-tinned rabbit: boiling for two hours had failed, as might be expected, to destroy the type F organism which happened to be present in this meat. Is this method of preserving food the explanation of the occurrence of this disease exclusively—so far as we know—in Germany? None of the authors discusses this matter from a general point of view. It is possible that enteritis necroticans does occur outside Germany and has hitherto passed unrecognized as a specific disease, as well it might in view of the fact that the causal organism is only by refined methods distinguishable from a normal inhabitant of the intestine. It is to be hoped that this interesting series of papers, which can fairly claim to establish the identity of a new human disease, will enable others to recognize its existence elsewhere.

It is of some interest in this connexion that Mollaret, Prévot, and Guéniot[1] have recently described a case which they claim to have identified as a human equivalent of black disease in sheep—i.e., rapidly fatal hepatic necrosis caused by *Cl. oedematiens*. Except in the fulminating character of the disease the parallel between the two conditions does not seem particularly close, and the origin of

[1] *Ann. Inst. Pasteur*, 1948, **75**, 195.

the infection is obscure. The organism was recovered in cultures made from the liver with the fullest aseptic precautions post mortem, but it is not mentioned as having been demonstrated histologically. Despite some dubious features this case suggests that the possibility of such an infection in man may be worth while bearing in mind.

PROPHYLACTIC ARTIFICIAL LIGHTING

There is disagreement about the value of ultra-violet irradiation during the winter months as a protection against infections such as the common cold. Dr. Dora Colebrook, working for the Industrial Health Research Board, was unable to demonstrate any better health among a large number of workpeople who were irradiated than among controls who imagined they were being irradiated but in fact were not.[1] A new approach to the subject has been made by Ronge[2] in Sweden, who studied the effect on school-children of ultra-violet irradiation emitted from lamps which acted as the source of artificial lighting in the classrooms. A quartz mercury-vapour burner was enclosed in an outer bulb of special glass which absorbed the shorter but transmitted the longer ultra-violet wavelengths. These burners were mounted with reflectors painted with ultra-violet reflecting paint, and this paint was also used on the classroom walls. Supplementary incandescent lamps were used to tone the colour of the radiation. In Swedish schools during some of the winter months artificial lighting has to be used throughout the day, and practically no natural ultra-violet radiation reaches the earth during the winter. The dose of ultra-violet radiation in the classrooms was arranged so that some children received a daily "erythema-threshold" dose on their hands and faces, while others actually received a mild erythema dose: these latter became slightly pigmented on the exposed parts. There were no ophthalmic disturbances or other ill effects.

During this research detailed records were kept of all relevant physical and physiological observations. In Swedish children there is a seasonal variation in the plasma-calcium level, with highest values in the autumn and lowest in the late winter. This seasonal variation did not occur in the children whose classrooms were lit with the ultra-violet lamps. The haemoglobin concentration, which does not vary with the seasons, was unaffected by irradiation. A large dose of vitamin D was given to each one of a small group of children, but this did not increase the winter plasma-calcium level. Ronge devised a method of testing the physical fitness of the children by ascertaining the effect on the cardiovascular system of moderate muscular work on a bicycle ergometer. His results with this method appeared to show that the irradiated children were fitter than the non-irradiated controls. He attributed the difference to the effect of the irradiation in maintaining the amount of calcium in the plasma at summer level, but it is surprising to find that the non-irradiated children who received the large dose of vitamin D were also fitter than the controls.

Ronge also investigated the effect of the radiation on air-borne bacteria. He found that the bacterial count in irradiated classrooms was about half that in non-irradiated classrooms, and he believed that this accounted for the fact that the children in the former were less frequently absent from school than children in the latter. As the intensity of irradiation decreased when the emitters grew old, the children's absences became more frequent. No claim is made for any "protective" effect other than that ascribed to the bactericidal action of the ultra-violet radiation.

This experiment differs from others in that the irradiation was more or less continuous while the children were at school, and its main purpose was to determine what effect if any this irradiation had on the physical fitness of the children. A possible flaw in the experiment lies in the difficulty of controlling the mental attitude of children undergoing performance tests. Schoolboys would quickly realize that some were being taught in classrooms lit by the new ray while others were not, and it seems likely that the irradiated boys would perhaps regard themselves as "supermen," while the non-irradiated might not have the same confidence in their ability to put up a good performance.

[1] Industr. Hlth Res. Bd. Rep. No. 89, 1946. London: H.M.S.O.
[2] *Acta physiol. scand.*, 1948, **15**, Suppl. 49.

PROTECTING THE SKIN FROM IRRITANTS

The prevention of industrial dermatitis depends to a large extent upon cleanliness. When the cause of dermatitis is due to an allergic sensitiveness to some external contact the most scrupulous cleanliness and elaborate protective measures may fail, but where the occurrence of dermatitis depends upon the length of the period during which the irritant is in contact with the skin such measures are of major importance. The first requirement is a clean machine and a clean factory, to ensure that as little of the potential irritant comes into contact with the worker as possible: this is a problem for the engineer and not the medical man. Then follows the need to protect the worker by suitable garments and by the avoidance of prolonged contact with garments which may become impregnated with the irritant. Some help may be obtained from the use of appropriate barrier creams on exposed parts of the skin, but this procedure must be carefully and continuously supervised by a doctor or experienced nurse, and even so it has its limitations. The most important prophylactic measure is simple but efficient washing with soap and water immediately after work. The more knowledgeable workman has long known that washing is more effective when soap is massaged into moist hands to produce a thick soap emulsion than when it is diluted with large quantities of water, and in a recent paper on the subject of skin cleansers and protective creams Cruickshank[1] confirmed this and has suggested that even better results are obtained by using equal parts of milled, dried soap powder and fine wood flour. This no doubt has adsorptive properties and perhaps some abrasive action, and it prevents caking of the soap powder. The mixture would not be suitable for putting up in tablet form because of a tendency to abrade the skin.

In assessing the value of cleansers and barrier creams as a protection against the irritation caused by mineral oils Cruickshank carried out tests on three grades of oil —machine oil, cutting oil, and soluble oil—which vary in the ease with which they are removed from the skin. The efficacy of cleansing procedures was judged by observing the amount of fluorescence under ultra-violet light from oils remaining in the follicles. He did not find that barrier creams gave satisfactory protection, though creams with a soapy base were effective for limited periods; they also have the virtue of diluting the irritant and of making easier its removal by washing. Thorough cleansing of the skin after work is still of the first importance, and the sulphonated oils, which have found favour as cleansers in industry, proved less effective in removing the oil than the soap powder and wood flour emulsion.

[1] *Brit. J. industr. Med.*, 1948, **5**, 204.

NATIONAL FORMULARY

The 1949 *National Formulary*, which is published this week, represents the culmination of three years' careful work by the Joint Formulary Committee. It was in 1946 that a committee representing the British Medical Association and the Joint Committee on a National Pharmaceutical Service recommended that the medical and pharmaceutical professions should set up this committee to compile a standard prescribers' formulary. In its work the committee has received advice from the Royal Colleges and from other professional bodies, and it has also had the assistance of the British Pharmacopoeia Commission and the co-operation of the Ministry of Health and the three Service Departments. It will take some time to distribute the new *Formulary*, and so it will not officially displace the *National War Formulary* until May 1.

The provisional list of preparations from which the *National Formulary* has been prepared was submitted to a large number of bodies representing medical and pharmaceutical practice, and many of the amendments and suggestions received have been incorporated in the final work. The *Formulary* is not, and was not intended to be, exhaustive, and prescribers are in no way limited to the preparations listed. It is not suggested that hospitals, for example, should restrict the range of preparations in use, though it is hoped that the duplication of formulae of substantially the same composition will be avoided. The subdivisions of the *Formulary* are familiar. Formulae are grouped according to the method of use, as in the case of the collutoria, injectiones, lincti, cremores, gargarismata, and so forth. Two new titles have been introduced. Dusting powders are called "conspersi," to distinguish them from the "pulveres" intended for internal use, and the term "vitrellae" is used to describe the small crushable glass capsules which contain such drugs as amyl nitrite. All the formulae are arranged alphabetically under Latin names according to the groups into which they fall. Special care has been taken in the infants' section to provide preparations, especially linctuses and mixtures, in a palatable form. The appendices include a list of proprietary preparations and the drugs or formulae which are substantially identical with them or of reputed analogous therapeutic effect. There is also the list that should now be known in most hospitals indicating the identifying colours and appropriate labels for medical gas cylinders. Metric and imperial equivalents are listed, and prescribers are told that the contraction "ml." should be used for millilitre and that the "cubic centimetre (c.c.) should not be used as a unit of volume."

No formulary of this kind can ever satisfy completely all the possible users. Yet it is probably true to say that the committee has achieved its main objective. It has compiled a convenient pocket-sized volume which will meet most of the everyday needs of general and hospital practice. Copies of the *Formulary* can be obtained, price 2s. 6d. post free, from the British Medical Association or from the Pharmaceutical Press, 17, Bloomsbury Square, London, W.C.1. Provision has also been made for the supply of interleaved copies, which will cost 4s.

PREGNANCY AND HEART DISEASE

The effect of pregnancy on chronic rheumatic heart disease is usually considered to depend on the extent of the anatomical changes in the heart, the functional capacity as judged by previous symptoms of failure and the occurrence of arrhythmias, and the age of the patient. In an attempt to improve the assessment of the outcome of pregnancy in patients with rheumatic heart disease Bunim and Rubricius[1] have recently analysed their findings in a series of 142 patients whom they followed through pregnancy and the puerperium. In 11 of them the prognosis was considered so poor that the pregnancy was terminated. The remaining 131 patients gave birth to 133 infants; two of the women died undelivered and four gave birth to twins. One of the deaths was the result of an unexplained staphylococcal septicaemia and the other of heart failure; in the latter case the patient, who was in her seventh pregnancy, had been advised to undergo sterilization but had refused. There were no deaths from heart failure in the 129 patients under proper care during the pregnancy and the puerperium. The mortality (stillbirths and deaths within 48 hours of birth) of infants whose mothers had heart disease but were not in failure was not statistically different from that of infants of normal mothers (9% compared with 7%), but it was considerably higher in infants delivered of mothers whose hearts were failing (30%). Although this seems a striking difference, there were only 18 mothers in this group and the figure is just not statistically significant. Failure developed in the second half of pregnancy, and occurred more often in the last month than in any other preceding month. In 103 patients it was possible to discover the time of onset of the disease of the heart, and only 4% of those with less than 10 years' history developed heart failure during pregnancy as compared with 18% of those who had had rheumatic heart disease for more than 15 years. Further, the older the patient the greater was the risk of failure. There was also a close correlation between the incidence of cardiac failure during pregnancy and the previous cardiac reserve. Seven of nine patients with a history of previous heart failure developed a further attack of failure during pregnancy, whereas of 22 with no such history 11 developed failure. Contrary to expectation, patients with aortic insufficiency fared no worse than those with a mitral lesion. The effect of cardiac enlargement was not clear cut, while failure did not occur in any patient whose heart was less than 10% larger than normal, in some cases hearts 20–30% larger than normal also remained compensated. There was no difference in the effects of pregnancy on the hearts of primiparous as compared with multiparous patients, and no evidence was found that pregnancy, provided it was survived successfully, influenced the subsequent course of rheumatic heart disease.

The authors conclude from their findings that in the prognosis of heart disease in women who are pregnant there are many factors which may influence the outcome, but the guiding principle is to assess the stage which has been reached in the natural course of the disease.

[1] *Amer. Heart J.*, 1948, **35**, 282.

JAUNDICE IN PREGNANCY

Although jaundice is a rare complication of pregnancy, it is alarming because of its possible association with toxaemia on the one hand and of the increased liability to acute yellow atrophy in pregnancy on the other. This possible dual aetiology formed the background for a study by Nixon and his colleagues,[1] who performed punch biopsy of the liver in 11 cases of jaundice in pregnancy and attempted to correlate the results with the clinical findings. From their histological investigations they found evidence in nine cases of an acute or subacute hepatitis indistinguishable from that seen in infective hepatitis; these were labelled "concomitant jaundice." Conspicuous liver changes in the remaining two cases were absent, and the condition was called "jaundice of pregnancy." Curiously enough, in these two patients the serum protein values were more considerably altered than in the others, and one of them died. There was only one other death in the whole series. This apparent lack of correlation between the

[1] *J. Obstet. Gynaec. Brit. Emp.*, 1947, **54**, 641.

clinical and histological data is perhaps an argument against the authors' proposal to divide these cases into two distinct groups. The findings, however, add useful information to what is known about the aetiology of jaundice in pregnancy, and it is to be hoped that further studies of this kind will be made.

PREVENTION OF RHEUMATIC FEVER RECURRENCES

Current views on the aetiology of acute rheumatism might perhaps be summarized by stating that the precipitating factor in the majority of cases, if not in all, is infection with the haemolytic streptococcus. This infection in a susceptible patient will result in an attack of acute rheumatism, but the causes of individual susceptibility are the subject of more debate. Some think it is inherited, and it has been claimed that this inheritance is effected by a single autosomal recessive gene.[1] To others the family incidence appears related not to an inherited factor but to the fact that the different members of the family live under the same environmental conditions. It has been shown that, while the incidence of acute rheumatism is much higher in families with a family history of the disease, the increased risk in any individual member of the family operates only so long as he or she remains in this family. After leaving the home brothers and sisters of rheumatic patients are no more liable to acute rheumatism than are members of a non-rheumatic family.[2] The causal agent in the unsatisfactory environment also is not clear. Poverty is a factor, and several workers have suggested that the root of the trouble is some nutritional deficiency, though no clear-cut deficiency has ever been demonstrated.

Attempts have been made to prevent relapses by measures designed to protect rheumatic children from precipitating haemolytic streptococcal infections, and considerable success has been achieved in the United States by the continued administration of relatively small doses of sulphonamides. However, this procedure is not free from objections, and experience in this country has shown that apart from rheumatic recurrences the treated children do not progress so well as untreated controls. As might be expected, attempts to prevent rheumatic relapses by correcting environmental faults have also been made. One of the objects of the prolonged treatment of children with acute rheumatism in hospital schools in the country is to provide the fresh air, sunshine, good food, and facilities for adequate rest which may be lacking in the child's home. Coburn and Moore[3] claim that the addition of four eggs a day to the diet of rheumatic children prevented relapses despite upper respiratory infection with the haemolytic streptococcus.

More recently the result of improving the diet and the general care of a group of rheumatic children has been studied by Jackson and his colleagues[4] in Iowa. After the child is discharged from hospital the parents are advised about his proper care, the home is frequently visited, and steps are taken to ensure that the diet is rather more than adequate. A daily consumption of one quart of milk, one or two eggs, a serving of meat, fish, chicken, or liver, two vegetables, two fruits, one teaspoonful of cod-liver oil, and six teaspoonfuls of butter or margarine was regarded as essential. Bread, cereal, and potatoes were added as required to satisfy the appetite. (To British ears such a diet sounds like that of a Lucullus.) When this regime was carried out it was found that rheumatic relapses were much lower than would be expected in a comparable group of rheumatic children in Iowa not receiving such improved care. However, the recurrence rate, though low, was higher than that reported for children given sulphonamide prophylaxis. The Iowa workers suggest that sulphonamide prophylaxis of acute rheumatism might well be reserved for those children with heart lesions whose diet and general care are likely to be poor. This study is of interest not only as a guide to the care of rheumatic children but also as evidence of the validity of the theory that the onset of acute rheumatism is aided by unsatisfactory living conditions.

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[2] Griffith, G. C., Moore, F. J., McGinn, S., and Cosby, R. S., *Amer. Heart J.*, 1948, **35**, 438, 444.
[3] *Amer. J. Dis. Child.*, 1943, **65**, 744.
[4] *J. Pediat.*, 1947, **31**, 390.

THE HEPATITIS OF HYPERTHERMIA

Treatment of a number of chronic ailments by induced hyperthermia is now a well-established procedure. Jaundice apparently resulting from parenchymal hepatic damage may be a complication of this treatment, and in one series it occurred in 19% of the cases.[1] Fortunately the lesion is usually mild and recovery prompt; rarely, and for no obvious reasons, severe damage is done, and the outcome may be fatal. Such a case has recently afforded an opportunity for histological examination of the liver; this showed a severe and extensive necrosis of centrilobular zonal distribution.[2] A particularly noteworthy feature, however, was the presence of intranuclear and intracytoplasmic eosinophil inclusion bodies. Similar lesions associated with intranuclear and intracytoplasmic inclusions have also been observed following fatal burns[3 4] and in two virus diseases, yellow fever and Rift Valley fever.

Several mechanisms have been suggested to account for the association of liver injury with burns. The occurrence of similar lesions following therapeutic hyperthermia excludes both the action of hypothetical toxins liberated from the burnt tissue as well as exogenous poisons such as tannic acid used for coagulation therapy. The presence of inclusion bodies of course suggests a virus, and the suggestion is supported by the observation that 66% of cases undergoing hyperthermia therapy develop a viral herpes.[2] But the rapidity with which the lesions may appear is against this view, and there is no definite evidence that the inclusions in question are of viral origin. Brown and his colleagues[5] justifiably stress the importance of circulatory collapse during hyperthermia and its relationship to salt and water depletion, and Maegraith and his co-workers[6] have recently called attention to the part such collapse may play in the genesis of hepatic necrosis. MacDonald,[1] however, found no evidence of such depletion in his patients, who were also being treated with sulphonamides; he considers that the high temperature may have increased the toxicity of the drug with consequent damage to the liver. This theory, too, is unsatisfactory, since with the exception of the comparatively rare cases of sulphonamide sensitization these drugs are not hepatotoxic; on the contrary, in certain circumstances they may protect the liver from damage by such a well-known liver poison as chloroform.[7]

Several authors have recently drawn attention to the susceptibility of the liver to anoxia. This susceptibility is partly the outcome of its peculiar double blood supply and partly the result of its high level of metabolic activity. Any condition leading to an increase of the latter, particularly if associated with factors tending to reduce the hepatic blood flow, places the centrilobular zones in a precarious position, and a tipping of the balance on the wrong side could readily lead to central zonal necrosis. Hyperthermia is just such a condition, and the frequency with which it results in zonal necrosis is no more than might be expected on purely physiological grounds.

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STREPTOMYCIN IN THE TREATMENT OF TUBERCULOSIS

REPORT OF A SUBCOMMITTEE

The Standing Advisory Committee on Tuberculosis in August last year set up a subcommittee* to advise the Ministry of Health and the Department of Health for Scotland on the application of streptomycin. The subcommittee has now prepared a report in which the following points are stressed.

Miliary and Meningeal Tuberculosis

For miliary and meningeal tuberculosis a daily intramuscular dose of 20 mg. per pound body weight up to a maximum of 2 g. is recommended. Intramuscular treatment should be maintained for at least four months, and in some cases further courses may be required. In addition, for meningitis 50–100 mg. of streptomycin dissolved in 5–10 ml. of saline should be injected intrathecally daily. The optimal frequency of intrathecal injection is not yet established, but it seems advisable in the average case to give intrathecal injections daily for the first three weeks and then every other day for two weeks. Further courses of intrathecal injection are probably necessary. The course of tuberculous meningitis under streptomycin treatment is very variable, and may be complicated by spinal block interfering with intrathecal therapy. Among the many schemes of dosage that have been used the following are two examples :

(i) Intramuscular streptomycin during weeks 1–3, 5–7, 10–12, 14–16. Intrathecal treatment every day during the first week, and on alternate days during weeks 2, 3, 5, and 10.

(ii) Intramuscular streptomycin during weeks 1–12, 17–20. Intrathecal streptomycin daily during weeks 1–4, 9–12.

In tuberculous conditions other than miliary and meningeal, 2 g. daily was at first the usual dose for all adult patients, but this produced toxic effects in most cases ; 1 g. a day has been found to be less toxic, and is possibly equally effective ; 0.5 g. a day is still less toxic, but its efficacy has not yet been fully established. It may be more satisfactory to adjust the dosage to body weight. As a general guide to dosage in both children and adults, 10 mg. per pound body weight per day is suggested. Since toxic effects are more severe in older age groups, the dosage should be lower for patients over the age of 45. The most recent evidence suggests that the maintenance of a fairly constant streptomycin blood level by injection at frequent intervals during the day is unnecessary. The administration of the daily dose in one or two injections is recommended.

No single scheme can be considered suitable for all forms of tuberculosis. According to present knowledge maximal effect is reached within the first one or two months, and for most cases other than miliary or meningeal tuberculosis it is useless and may be dangerous to treat continuously for more than three months. On the other hand, it is probable that treatment for less than one month is ineffective.

Toxicity

Vestibular damage is the commonest toxic effect. The damage to vestibular function is often irreversible, but some degree of compensation occurs, and unless the signs of dysfunction are sought the sequelae may be overlooked, particularly in the later stages. The danger of toxic effects increases with age, and they occur with especial frequency after middle age.

Vertigo most often begins in the fourth or fifth week of treatment. Nystagmus or altered vestibular reactions are frequent and may occur even in the absence of subjective symptoms. Difficulty in reading is sometimes complained of during the early stages of vertigo, but is usually transitory.

Careful watch should be kept for evidence of vestibular dysfunction. Tests such as the caloric reaction should be carried out where feasible, and in ambulant patients functional tests such as the Romberg test, walking along a straight line with eyes open and closed, or walking on a mattress.

Nausea, anorexia, and vomiting may begin during the third or fourth week and may be quite severe, but are often relieved by antihistamine drugs such as "benadryl" 50 mg. by mouth. Sensitization reactions such as skin eruptions and pruritus in the early stages of treatment are also usually relieved by antihistamine drugs.

Local pain at the site of injection may be relieved by adding 0.5 ml. of 1% procaine to the solution for injection.

Albumin and casts have been found in the urine in some cases. With the moderate dosage at present used, these abnormalities subside without discontinuing treatment. Serious neurological sequelae due to meningitis should be distinguished from toxic effects due to streptomycin.

In view of the risk of sensitization in attendants handling streptomycin it is advisable that they should wear rubber gloves while handling streptomycin and should wash the hands after removing the gloves.

Streptomycin Resistance

This eventuality must be borne in mind. A long-term plan of treatment should be made ; in this a course of streptomycin can only be a part, and one which can probably not be repeated effectively. If the drug is indiscriminately used, particularly in advanced cases with copious sputum, resistant strains will be disseminated. In order to detect dissemination of resistant strains, at the start of treatment in any particular case material if available should be collected for culture and the bacilli isolated and tested for streptomycin sensitivity.

In the present state of knowledge the simplest general criteria recommended for selection for streptomycin might be as follows : "Pulmonary tuberculosis in which the lesions requiring treatment are of recent development, progressive, and unlikely to benefit from conventional methods (e.g., bed-rest and/or collapse therapy) alone." Streptomycin should not be used as the only therapeutic measure in pulmonary tuberculosis. Indeed its major role may be to make possible the use of collapse procedures which in its absence would have had to be delayed or never performed.

Indications

Every diagnosed case of miliary and meningeal tuberculosis should be treated, but treatment of meningitis is difficult and prolonged, and miliary cases may be complicated by meningitis even while under streptomycin treatment. For these reasons streptomycin should be given only in hospitals with the best facilities.

Streptomycin is of proved value in ulcerative tuberculosis of larynx, trachea, bronchi, tongue, and pharynx. In laryngitis and tracheo-bronchitis the diagnosis should be confirmed where possible by laryngoscopy or bronchoscopy before treatment is started, and the examination should be repeated during and at the end of treatment in order to provide full assessment of the effects of streptomycin therapy. No additional advantage is apparently derived from giving streptomycin by method other than intramuscular.

Prophylactic use of streptomycin to "cover" routine thoracoplasties in the hope of decreasing the incidence of postoperative spreads is not recommended on present knowledge. It should be reserved for the treatment of spreads when they actually occur. Prophylactic use before and after resections of the lung for pulmonary tuberculosis is probably of value, but the best scheme of dosage for this purpose is not yet established. The value of streptomycin injected locally into infected subscapular spaces after thoracoplasty is established. Systemic treatment in addition to local may be of value.

Streptomycin often produces healing in tuberculous cutaneous sinuses and fistulae ; local treatment in addition to systemic may be of value.

Favourable results have been reported in tuberculosis of the alimentary tract and peritoneum. Symptomatic improvement may occur rapidly, but relapses are frequent. Streptomycin may prove of benefit in some types of genito-urinary tuberculosis, and a few encouraging results have been obtained in bone and joint tuberculosis, but these are far from conclusive, and streptomycin treatment here too cannot replace standard therapy.

All the recommendations here summarized are provisional and will require modification as further experience accumulates. It is certain that indiscriminate use of streptomycin carries with

*Sir Robert Young is chairman of the Streptomycin Subcommittee, and the members are : A. S. Hall, D. P. Sutherland, C. Price Thomas, Norman F. Smith, J. G. Scadding, E. H. Hudson, G. S. Todd, Andrew Morland, N. Lloyd Rusby, L. E. Houghton, W. E. Snell, A. L. d'Abreu, James Watt, P. M. D'Arcy Hart, Marc Daniels, and J. H. Harley Williams, who is the secretary.

it dangers both to the individual and to the community. The tendency to "try" this drug in every form of tuberculosis is to be condemned.

Streptomycin is generally supplied in one of three forms—as the hydrochloride, the sulphate, or a calcium chloride double salt. Since a mixture of the sulphate and the calcium chloride complex in the test-tube produces a precipitate of calcium sulphate it is recommended that a change-over from one of these two salts to another in intrathecal administration (and probably also in intramuscular administration) should be avoided; if a change has to be made it is recommended that several weeks elapse between the last injection of the one salt and the first injection of the other.

ROYAL MEDICAL FOUNDATION OF EPSOM COLLEGE

PENSIONS, SCHOLARSHIPS, GRANTS

Epsom College has available at the moment one or two St. Anne's Scholarships for girls attending Church of England Schools. Candidates must be fully 9 years of age and the orphan daughters of medical men who have been in independent practice in England or Wales for not less than five years. The value of each scholarship is dependent upon the means of the applicant and the locality and fees of the school selected.

There are also available: (*a*) pensions for necessitous medical men fully 55 years of age, provided they have been registered for five years, and for the widows of medical practitioners who are 60 years and upwards (awards are made as vacancies occur); (*b*) scholarships and grants for children of either sex, not necessarily orphans, but candidates must be of public-school age and in need of such help; (*c*) grants from the Eastes Trust for the relief of registered members of the profession of any age, their widows and orphans, and for the educational assistance of their daughters or sons. Full information and forms of application are available, on request, from the secretary, Epsom College, Surrey.

Reports of Societies

RENAL LESIONS ASSOCIATED WITH PREGNANCY

A meeting of the Section of Obstetrics and Gynaecology of the Royal Society of Medicine was held on Jan. 21, with Professor HILDA LLOYD in the chair, for a discussion on the pathological features of cortical necrosis of the kidney and allied conditions associated with pregnancy.

Professor JAMES YOUNG said that the discussion concerned those acute states in relation to pregnancy which had as their dominant features anuria or severe oliguria, increasing azotaemia, and uraemia. The result was death, usually within seven to twelve days, or, alternatively, increasing diuresis associated typically with a rapid disappearance of the uraemia, ending in the ordinary case apparently in complete recovery. This clinical sequence was found in cases of accidental haemorrhage, anuria being more frequent in "concealed" than in so-called "revealed" cases, and in obstructed labour, especially where there had been long-continued compression trauma of the soft passages. In concealed haemorrhage and in puerperal trauma the sequence was usually preceded by clinical shock, which might be severe. A striking feature in both these conditions was the selective nature of the renal lesion. In the case of traumatic anuria, however, the renal failure might be associated with a "massive" degenerative lesion of the liver and jaundice, the degeneration affecting especially the mid-zonal and central regions of the lobule. While the renal lesion might be typical, the fatigue of prolonged labour, severe nutritional disturbances, and inept anaesthesia had often contributed to the production of complex pathological changes.

The same sequence was also found in rare cases of eclampsia; very rarely in the course of a pregnancy which seemed otherwise normal; and in a group of conditions in which it was merely incidental to the pregnancy, as, for example, incompatible transfusion, or after the administration of sulpha drugs, or in association with certain infective conditions in the puerperium, especially that due to *Cl. welchii*.

Aetiology

Of the proximate aetiology little was known. It had been suggested that the renal lesion was due to anoxia from circulatory collapse following the shock of utero-placental haemorrhage. But in 59 consecutive cases of severe haemorrhage at childbirth necessitating blood transfusion the anuric sequence occurred only in 5 out of 10 cases of concealed accidental haemorrhage, and in none of the 37 cases of post-partum bleeding and the 12 cases of placenta praevia. Moreover, all degrees of the anuric phenomenon were clinically recognizable, and in the milder cases there had often been no evidence of shock whatever. Even complete suppression of urine could occur in a case without any shock.

The view sometimes taken that the whole sequence—accidental haemorrhage, anuria, azotaemia—was merely one manifestation of pregnancy toxaemia was supported by the frequency with which it occurred as the final and critical climax in a toxaemic patient; but there was no doubt that the anuric and uraemic sequence post-dated the acute utero-placental lesion. He thought the conclusion was not to be evaded that it was this lesion which precipitated the damage to the kidneys.

Confining himself to the findings in cases of concealed accidental haemorrhage, Professor Young said that, despite the uniformity of the clinical sequence and of the utero-placental changes in such cases, two quite different types of lesion were found in the kidney: (1) bilateral cortical necrosis, which was now believed to be the rarer of the two, and (2) the lower nephron lesion, affecting the second convoluted and collecting tubules, associated with degeneration of the epithelium and, though not invariably, with the deposition of crystals of blood pigment in the tubules.

The resemblance between the renal lesions in these and in crush cases raised the possibility of a basic similarity in genesis. It seemed unlikely that tubal blockage by pigment casts was an essential factor in either condition. Since in both conditions there was massive tissue damage—damage of muscle in the anuria following crush injuries and of the placenta in concealed accidental haemorrhage—it was conceivable that toxic metabolites from the tissues played an essential part. In the anuria of the crush syndrome recovery could be expected in a considerable proportion of cases with appropriate treatment. The majority of cases of anuria following accidental haemorrhage recovered, and it might be assumed that the lesion in these obstetrical cases was more likely to be of the lower nephron type and less likely to be cortical.

Finally, Professor Young reminded the Section that the pathology in these cases might have a special relevance to the genesis of pregnancy toxaemia. He had referred already to the by no means uncommon occurrence of eclampsia with or without the anuric sequence in cases of concealed accidental haemorrhage. Further, it had long been known that blood pigment casts were relatively common, with or without tubular degeneration, in eclampsia. The significance of such findings was not easy to assess. It was clear that they did not constitute more than an occasional occurrence, and even in the kidneys of a patient with eclampsia dying from this type of anuria the pigment casts might be absent.

Other Views

The remainder of the discussion took the form of short reports by a number of workers. Dr. G. M. BULL (with whom were associated Dr. A. M. Jockes and Dr. K. Lowe), speaking of some work at Hammersmith Hospital, said that they had been interested in cases of anuric uraemia presenting some special problems. The most important point in treatment in the anuric phase was the maintenance of a correct water balance. Water overload was the most frequent cause of death in anuria. He emphasized the importance of a salt-free and potassium-free diet. Cortical necrosis was almost invariably fatal; in the other type of lesion recovery took place in a large proportion of cases.

Dr. J. F. SMITH described the morbid anatomy of uraemic cortical necrosis. It was not only in cases of septic abortion that these conditions were found; he had examined material from 17 fatal cases of eclampsia and had found pigment casts in 3, with some lower nephron changes in each case. He added that he had come across some cases of severe oliguria associated

with pregnancy in which death occurred suddenly after the administration of potassium citrate in substantial doses. If such a drug was given it was desirable that it should be the sodium rather than the potassium salt.

Professor KENNETH FRANKLIN discussed experimental findings and showed a coloured film illustrating the renal "shunt" mechanism in rabbits. He and his colleagues had advanced the hypothesis that in the toxaemia of pregnancy there was an increasing tendency to renal shunt. He defended the use of the word "shunt," although it had been challenged; it was a word coined and widely used in America, and its dictionary definition was "movement from one set of rails to another," which was what happened. When the tendency to shunt was slow it might be regarded as a physiological reaction calculated to give the uterus and its contents a better blood supply at the expense of the renal cortex.

Dr. J. F. HEGGIE described the first demonstrable lesion in the kidney in cortical necrosis, and showed the findings in an early case in which the patient died after two days' anuria. The glomeruli were shown uniformly dilated and filled with red blood corpuscles. At the same time or shortly afterwards congestion of the glomeruli occurred. The pressure might be such as to force red blood corpuscles from the main stream into the wall of the interlobular artery. He also spoke of the conditions in which recovery was possible. Dr. S. J. DE NEVASQUEZ believed that the essential primary lesion was a diffuse necrosis and discussed the factors which led to blockage by stagnation of blood cells.

Mr. T. L. T. LEWIS grouped the cases as (1) fatal cases of anuria in which the diagnosis of cortical necrosis was made post mortem; (2) fatal cases in which the diagnosis of lower nephron necrosis was made; and (3) recovered cases, in a few of which a biopsy had been carried out. In the first two groups the appearances were distinctly different, but the clinical pictures were similar. The withdrawal of heavily blood-stained urine heralded the onset of cortical necrosis. The patient remained cheerful all the time until near the end, when she became comatose. All the evidence pointed to a circulating toxin, and it was conceivable that following the sudden appearance of a toxic substance in the circulation the kidney dealt with it in one of two ways: either the remote vascular mechanism was brought into effect or else the specially susceptible cortex became engorged and finally blocked. In the first case lower nephron necrosis and, in the second, cortical necrosis developed. The latter was invariably fatal; lower nephron cases recovered, given time, and time was the vital element in recovery.

NORTH OF ENGLAND OBSTETRICAL AND GYNAECOLOGICAL SOCIETY

Following the annual general meeting of the society at the University of Manchester on Jan. 21, the new president, Mr. S. B. HERD, of Liverpool, took the chair.

Mr. S. W. LIGOETT described a case of spontaneous rupture of the uterus in a patient aged 76 who had been operated on for prolapse at the age of 60. Sixteen years later she developed symptoms of torsion of an ovarian cyst and at laparotomy was found to have free blood in the peritoneal cavity, a distended uterus and left tube, and perforation of a fibrous saccule in the left uterine cornu. Subtotal hysterectomy with left salpingo-oophorectomy was carried out successfully.

Dr. W. CALVERT read a paper on ectopia vesicae. He had been able to trace twenty women who between them had had twenty-eight children, and after reviewing these cases he described one case which had been brought to his notice. This patient had had the ureters transplanted into the colon and the bladder excised for ectopia vesicae as a child, after which she had been able to live an active ordinary life as a schoolgirl and secretary. After marriage she had a successful vaginal plastic operation for dyspareunia and later conceived. During pregnancy there was renal insufficiency and near-term caesarean section with sterilization was performed, a healthy child being delivered. Recovery was uneventful.

Mr. F. J. MILWARD described cases of endometrioma of the umbilicus in a patient aged 38, and persistent vitelline duct with subjacent cyst and Meckel's diverticulum in a child of 9 years.

Correspondence

Aetiology of Erythema Nodosum

SIR,—In your annotation on this subject (Jan. 29, p. 188) you state:

"In the majority of adults . . . migratory arthritis was part of the clinical picture, and in some adults similar attacks of polyarthritis without erythema nodosum had occurred up to twenty years before. The belief that erythema nodosum is a manifestation of acute rheumatism dies hard in this country, yet despite the frequency of fleeting joint and limb pains Favour and Sosman could find no evidence that there is any close relationship between the two diseases. In fact they conclude quite categorically that erythema nodosum is not a form of rheumatic fever."

Sir Arnold Stott and I published a short paper[1] in 1940, in which we described a series of such cases sent to an Army hospital, mostly with the diagnosis of rheumatic fever and presenting in many instances also the appearance of erythema nodosum. We were able to show as the result of serial blood cultures that these cases were in fact instances of low-grade meningococcal septicaemia. The history of recurrent attacks in several of these cases also went back for a number of years. Subsequently other cases were seen and recognized as being of the same aetiology. We concluded that the condition, although unrecognized in most cases for what it is, may not be uncommon.—I am, etc.,

London, W.1. W. S. C. COPEMAN.

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[1] *Lancet*, 1940, **1**, 1116.

Overdose of Surface Analgesics

SIR,—I should be interested to know why Dr. D. Wilson (Jan. 29, p. 197) found it necessary to use such a great concentration as 10% cocaine hydrochloride for anaesthetization of the urethra. I have found a mixture of equal parts of 1% cocaine hydrochloride and 1% sodium bicarbonate prepared immediately before use quite satisfactory, and it seems likely to be safer than 10% cocaine hydrochloride. The addition of an alkali to cocaine to enhance its action is discussed in Martindale's *Extra Pharmacopoeia* under the heading "Activated Alkaloidal Solutions" (vol. 18), and under the heading "Injectio Cocainae et Sodii Bicarbonatis" (vol. 21) is shown the same mixture with "chloretone," a mixture favoured by the late Mr. Canny Ryall.

Incidentally, I should like to add a tip for urethroscopists who like to anaesthetize the urethra before examination. If the urethra is filled with the anaesthetic solution and the patient does not urinate after it has had time to take effect the urethra is inconveniently wet, requiring much mopping, but if he urinates before the instrument is passed very little mopping is required. I must not occupy your space by discussing the reason.—I am, etc.,

London, S.W.1. L. W. HARRISON.

Anuria

SIR,—Dr. J. F. Heggie's argument (Jan. 22, p. 151) appears to call for comment. He states that owing to certain events vasoconstriction of the renal arterioles "brings about the greatest reduction in calibre" of those supplying glomeruli "in the outer- and mid-cortical" regions, while "as a consequence the circulation through the juxtamedullary (15%) and some (5%) deep cortical glomeruli and the medulla is greatly augmented." May I ask him how it comes about that a general stimulus causing vasoconstriction of renal arterioles should be specific, affecting the arterioles of the outer two-thirds of the cortex and so unaffecting those of the inner third that an augmented blood flow through occurs? What is sauce for the goose is sauce for the gander! Dr. Heggie's argument appears untenable.

On Jan. 21, 1949, at the Royal Society of Medicine, eight papers on the pathogenesis of cortical necrosis of the kidney were read. Not one of the speakers mentioned a fundamental condition affecting the renal blood flow—the secretion of urine

In October, 1947, at a discussion on the renal circulation I pointed out[1] that Brodie had shown that if the ureter be clamped during diuresis the kidney becomes almost bloodless.[2] That during activity of an organ the blood flow through tends to be checked, to be limited, or even stopped is not peculiar to the kidney. Each time the heart contracts, the capillaries in its musculature, permeating the tissues of the ventricles, are clamped, so that no blood goes through at all.—I am, etc.,

Rugby. R. H. PARAMORE.

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1 *Proc. R. Soc. Med.*, 1948, **41**, 342.
2 *Proc. roy. Soc. B.*, 1914, **87**, 571.

Infected Disk after Lumbar Puncture

SIR,—In their article on infected intervertebral disk after lumbar puncture (Jan. 22, p. 132) Mr. L. L. Bromley, Dr. J. Donaldson Craig, and Mr. A. W. Lipmann Kessel do not mention the simplest and most effective precaution against damage. For very many years it has been the standard practice among anaesthetists to tilt the needle towards the patient's head when doing lumbar puncture. If pushed too far the point will impinge on the next higher vertebral body, which may damage the former but not the latter. If, however, the needle is introduced at right angles to the skin over-enthusiasm will force its point into the intervertebral disk. In young patients with flexed spines the disks bulge towards the dura, and puncture of the thin annulus fibrosus may cause seepage of the nucleus pulposus with ultimate collapse of the disk. The unfortunate patient is then all set for a long period of invalidism. —I am, etc.,

St. Albans, Herts. C. LANGTON HEWER.

Cinchocaine

SIR,—I beg to comment on the new official name of that familiar anaesthetic drug "nupercaine." It is now to be called cinchocaine. This name can be justified pharmacologically in that it suggests, rightly, a derivative of cinchoninic acid, but I feel that it is dangerous. Imagine a verbal order given by an impatient or irate anaesthetist (or conceivably a surgeon) in the course of a busy list. How easily the last two syllables might become the operative ones. It is true we put our cocaine in distinctive bottles, and in our hospital we colour the solution, but no precautions can be too great. I suggest that quinocaine would be a safer name and yet have the same pharmacological justification.—I am, etc.,

Birmingham. L. T. CLARKE.

Spinal Anaesthesia for Caesarean Section

SIR,—It is interesting that in the same issue of the *Journal* (Jan. 22) there should be a letter on the evergreen controversy which rages around this subject (p. 153), a report of a calamitous long-term sequel of lumbar puncture (p. 132), and another letter on the question of classical *v.* lower-segment operation (p. 156). It is unfortunate that so many of the disasters following lumbar puncture take so long to mature, because the original operator may be unaware that they have taken place or that his puncture has been anything less than 100% successful. It is also probable that minor disabilities such as backache may result from trauma inflicted at lumbar puncture and never come to light at all, being accepted by the patient as just another load to be borne in these hard times.

Lumbar puncture is often a very difficult operation to perform without touching bone or intervertebral disk, and is certainly not made easier by the presence of a full-term uterus, and I feel that a procedure with so many distant dangers is not justifiable for caesarean section except when the baby is very premature. Babies delivered by caesarean section generally cry immediately, whatever the anaesthetic, if it is chosen and given with reasonable skill. Ether in concentration enough to give plane 1 anaesthesia has remarkably little effect on the baby —far less than that of ¼ gr. (16 mg.) of morphine given two hours before.

But the babies which fail to cry are usually shocked, not anaesthetized. If the shock is not due to sub-oxygenation, which it need never be, it is in my opinion due mainly to trauma, and I think that the baby delivered through a poorly developed lower segment, after a prolonged tussle with Willett's and other forceps, is likely to be feeble for precisely the same reason as if it had been delivered after a difficult high forceps, and the anaesthetic has very little to do with it.

Mr. Percy Malpas (p. 156) tells of a case where extraction was impossible through the lower segment. There are many cases where it is wellnigh so, and in these, where a general anaesthetic has been given and the baby has to be resuscitated, the anaesthetist comes in for more than his fair share of the blame; while babies delivered easily and rapidly by a classical operation hardly ever give anyone a moment's anxiety.

I agree with Mr. Duncan Ballantine and Dr. F. L. Robertshaw (p. 153) that it is desirable to maintain controlled respiration or 100% oxygen inhalation while the uterus is emptied, but surely the first is rather a horrible experience for a conscious patient under spinal anaesthesia; while if she has to be given a whiff during this critical stage, is not the whole object of the spinal defeated?—I am, etc.,

Colchester, Essex. J. N. FELL.

SIR,—I have followed the recent correspondence on spinal analgesia for caesarean section with considerable interest and some amusement. I entirely agree with Dr. N. Beattie (Jan. 15, p. 114) that most of the hazards which are theoretically put forward against spinal analgesia have not been encountered in practice by those who have had personal experience of this procedure.

Some time ago I wrote to the *Journal* relating my impressions on watching Mr. Rufus Thomas performing lower-segment caesarean section under spinal analgesia. As I said at that time, I was most impressed with his technique and with the results, and I also stressed that I was at that time the only gynaecologist who had taken the trouble to see Mr. Thomas at work, although he had been advocating spinal analgesia for nearly ten years before I visited his clinic. Since then I have personally performed considerably more than one hundred lower-segment caesarean sections under "heavy" spinal analgesia, and I have had no reason to change my opinion as to the excellence of the method.

The uterus contracts usually extremely well after the baby has been removed, and bleeding is minimal. The baby causes no anxiety whatsoever, and frequently cries the moment that its head is delivered and when its body is still in the uterus. Falls of blood pressure do occur occasionally, but are not serious providing the technique described by Mr. Thomas is carried out, and the post-operative recovery has been in my experience uniformly excellent. It allows lower-segment caesarean section to be performed quietly and efficiently, and although I have on several occasions employed local anaesthesia I have not been able to obtain such satisfactory results so far as the actual operation is concerned.

I notice that Dr. Beattie refers to the use of light "nupercaine" anaesthesia and Mr. Duncan Ballantine and Dr. F. L. Robertshaw (Jan. 22, p. 153) to the use of an isobaric solution. About these two methods I cannot personally give any opinion, but I am in entire agreement with Mr. Rufus Thomas that nobody condemns all forms of inhalation anaesthesia simply because chloroform may at times be dangerous. Similarly, it is illogical to condemn all forms of spinal analgesia.

Mr. Rufus Thomas has obtained his excellent results, now amounting to nearly four hundred and fifty caesarean sections without a maternal death, using heavy nupercaine, and my results have been obtained using in the vast majority of cases heavy nupercaine and in other cases some form of "heavy" solution. None of my babies have been stillborn, and I have had no maternal deaths.
—I am, etc.,

London, W.1. D. G. WILSON CLYNE.

Malignant Tumour of the Small Intestine

SIR,—This communication on a case of primary jejunal cancer is prompted by Mr. F. J. C. Matthews's report (Jan. 22, p. 138) of the same type of growth in the ileum.

My patient, a man aged 53, was admitted as a case of perforated duodenal ulcer during Bristol's worst period of blitzing in October, 1940. He gave a three years' history suggestive of ulcer and had been in hospital under Dr. Richard Clarke, then senior physician. Skiagraphy had shown a pre-pyloric ulcer, but in the test meal the maximum rise of HCl was 9 (N/10 NaOH).

On examination he was somewhat flushed, flabby, and inclined to sweat. The only abdominal finding was epigastric tenderness.

Per rectum there was nil amiss. Pending operation he remained very miserable.

At operation (Oct. 11, 1940) I was astonished to find a typical string carcinoma on the jejunum, 10 in. (25 cm.) from the duodeno-jejunal flexure. In the related mesentery was a cluster of glands more or less discrete but suspiciously enlarged. To embrace these in the excision a large wedge of mesentery was excised, based on a 12-in. (30-cm.) resection of jejunum. Biopsy by Dr. A. D. Fraser revealed "columnar-celled adenocarcinoma of jejunum. Mesenteric glands all show subacute inflammatory changes." Two months later he was a "changed man."

On Feb. 12, 1946, when next I saw him, he reported that he had been taking alkaline stomach powders during the previous four months. Dyspepsia persisted, and skiagraphy (September, 1948) disclosed a peptic ulcer of finger-tip size in the lower curve of the stomach. He was transferred to the care of my general surgical colleague, Mr. Melville Capper, who agreed there was no sign of abdominal cancer. Under medical treatment his symptoms abated, and by December, 1948, the ulcer crater was obviously smaller.

The case is reported as an example of jejunal carcinoma apparently free from recurrence eight years after excision.—I am, etc.,

Bristol. A. WILFRID ADAMS.

Arsenical Toxicity

SIR,—Having read your annotation "Arsenical Toxicity" (Jan. 1, p. 25) quoting the work of Sexton and Gowdey[1] on the value of vitamin B_1 in arsenical encephalopathy, I would like to draw your attention to an article by me in the *British Journal of Venereal Diseases*[2] on five cases of this complication which occurred during intensive "mapharside" therapy.

It will be seen that I pointed out the clinical and pathological similarity between arsenical encephalopathy and syndromes resulting from deficiency of vitamin B_1 (i.e., alcoholism, Wernicke's encephalopathy, etc.), and that the use of vitamin B_1 appeared to be of distinct value both in prophylaxis and treatment. Furthermore, I suggested that pyruvic acid estimations might be an added safeguard in patients undergoing intensive arsenic therapy and that in view of the known role of the other members of the vitamin B complex in intracellular metabolism better results may be obtained by using the whole complex rather than vitamin B_1 alone.

Two further points in the annotation call for comment. (1) It is stated that brain haemorrhages occur in fatal cases, but it is well known that on several occasions these have been absent and only cerebral oedema found post mortem. I therefore suggested that the primary pathological change in arsenical encephalopathy is intracellular oedema, which only at a later stage gives rise to haemorrhage and focal necrosis. This conception of the basic pathological change is important not only in emphasizing the difficulties of early diagnosis but also in understanding that the changes are completely reversible. (2) *Hyperglycaemia.* Blood-sugar estimations were carried out in several patients in our series and no significant change in blood values was found. I find it difficult to understand why hyperglycaemia should occur, since the metabolism of glucose is interfered with at the pyruvic acid level and not initially.

Finally, more mature consideration of all the factors involved in arsenical toxicity as a whole has led me to believe that the liver plays some as yet unknown but vital part in the interaction of arsenic, vitamin B, and intracellular metabolism.—I am, etc.,

London, W.1. F. L. LYDON.

REFERENCES

1 *Arch. Derm. Syph., Chicago,* 1947, **55**, 634.
2 *Brit. J. vener. Dis.,* 1944, **20**, 87.

Taking Children's Temperatures

SIR,—We read with great interest the article on rectal temperature-taking by Professor Alan Moncrieff and Dr. B. J. Hussey (Dec. 4, 1948, p. 972) and feel that to many practitioners it will come as a valuable confirmation and contribution in the field of clinical paediatrics.

In our hospital, where most of the patients are Zulus, temperatures are taken rectally in doubtful cases in children up to 5 years of age. Dr. Joan Malleson's timely warning (Dec. 18, p. 1078) comes opportunely, however, more especially as we have recently had misgivings as to the effects of rectal stimulation of this kind in infants—misgivings reinforced by a closer knowledge of the almost universal custom found in Zululand of the daily or even thrice-daily administration of enemas to infants. These enemas may be either medicated or plain, and are given with a hollow reed or stem inserted into the child's anus. The mother is convinced that were this not regularly done the child would not have its bowels opened.

Various effects follow upon this custom: in the simplest cases the mother brings the child with "sores in the rectum" and, everting the anal skin, shows the pink mucosa which to her is the "sore." In the great majority of cases the child shows marked disapproval of this examination, wriggling and crying lustily. We are not yet satisfied as to the more complex effects of such hyperstimulation, but tentatively suggest that it may cause serious emotional imbalance, particularly in the sexual sphere. The gross hysterias found in a very high proportion of adolescent Zulu girls, constipation, vaginismus, etc., may quite possibly have their early origin in severe anal stimulation in infancy.

It is of interest to note that the Zulus themselves seem to have realized some connexion between anal stimulation and sexuality. In *The Social System of the Zulus* Krige writes (p. 67):

> "Every child is supposed to be tainted at birth with a constitutional defect called isigwemba, which is held to be the cause of several ailments such as unusual sexual irritability, causing lecherous inclinations in adults or disposition to eczema, etc. To get rid of this taint the stem of a castor oil or umsenge leaf (*Cussonia spicata*) or a stalk of fibre is thrust by the mother into the rectum of the child and vigorously twirled round between both hands until, by scraping on the membrane of the bowel, blood is copiously drawn. Not infrequently children die from this treatment."

While rectal temperature-taking by the sophisticated physician can hardly be fairly compared with the barbaric practices of the Zulu, we might do well to exercise humility in our judgment when we number among our own scientific advances the development of the atomic bomb.

In view of the possible danger of rectal stimulation, however innocently intended or skilfully accomplished, it might be wise to enter into no fixed routines of rectal temperature-taking, but rather to exercise clinical judgment in each case. A temperature difference between 103° F. (39.4° C.) and 103.5° F. (39.7° C.) would not appear in a case of lobar pneumonia to be of great import in assessing the total pattern of signs, while even in a case of rheumatic fever, where slight deviations from normal are important, we have equally valuable guides in the pulse rate and erythrocyte sedimentation rate.

We have banished the soap stick from the nursery. Should we abolish routine rectal temperature-taking, keeping it only for cases where slight differences are vital?—We are, etc.,

S. G. LEE.
Nqutu, Zululand. E. A. BARKER.

SIR,—Referring to the recent correspondence in the *Journal* on the taking of rectal temperatures, it seems remarkable to me that there has been no letter from psychiatrists supporting the position taken up by Dr. Joan Malleson (Dec. 18, 1948, p. 1078), who calls attention to the psychological dangers that may ensue from interference with the anal parts of infants. She quotes the late Dr. Forsyth's teaching in support of this—namely, "that all interference with the bodily orifices should whenever possible be avoided; for, being erogenous zones, they will quickly become 'conditioned' either positively or negatively to interference, and may later become responsible for various functional disturbances."

As a matter of interest, some six years ago in the *Journal* of Oct. 31, 1942 (p. 528), I published a letter attempting to put forward much the same views as Dr. Forsyth. In that letter I protested against Professor McNeil's recommendation that constipation of infants should be treated by frequent insertion of the doctor's little finger in the baby's anal canal. I gave an account of the psychological disorders of emotion, character, and sexual developments that can ensue from this practice and similar methods of interference.—I am, etc.,

London, W.1. A. CYRIL WILSON.

Approach to the Frontal Lobe

SIR,—Dr. P. Glees's plea (Jan. 29, p. 193) for co-operation between neurosurgeon and psychiatrist could not be better illustrated than in the problem of prefrontal activity. It is fairly certain that leucotomy by the standard or orbital approach, or by any other approach, is not the final answer to the surgical treatment of mental diseases.

In all neurophysiological research the task of solving a particular problem often draws the attention and interest of many investigators, and the literature of to-day is full of their now discarded claims. A new approach is useful for giving a different line of thought, and its recognized weaknesses and dangers can only give stimulation for further research. The work of Freeman has followed on "older methods" of bilateral section and may possibly lead to further observations and experiments which will ultimately cause rejection or modification of the original. I consider that prefrontal activity can be controlled by regulation of local blood supply and that this procedure in the hands of the neurosurgeon may become the operation of choice.

Whatever method is adopted or is subsequently fashionable, the selection of patients is best left to the psychiatrist, who will have the advantage of observing them for many years afterwards. Too often the experience of the neurosurgeon is limited to the post-operative sequelae. His interest in the patients ceases with their discharge from the ward. Neither is the psychiatrist fully equipped for their accurate study, as he has no knowledge of the exact pathways that have been severed in each case. Only when we have a precise method of interrupting clearly defined pathways will he be able to give a clear interpretation of its value.—I am, etc.,

Leeds. P. P. NEWMAN.

SIR,—The letter from Dr. P. Glees (Jan. 29, p. 193) is a welcome reminder that we must beware of a complacent attitude, developing in some places, towards the therapeutic exploitation of damage to the frontal lobe. I heartily approve his statement that the newest mode of attack is being introduced while we are still struggling to disentangle the results of present methods.

Reckless "advance" at any price, without evidence to justify it, is to be deplored, especially when it involves damaging a vital organ. "Present knowledge of the frontal lobe," he says, "does not as yet permit of advice being given to the neurosurgeon as to what he should destroy." I agree. But is knowledge all that matters? We must not only disentangle the results, we must, as doctors, disentangle the academic and theoretical from the practical and therapeutic. As Professor Alstead has very recently pointed out, "The growth of subdepartments remote from the hospital ward has favoured research which may contribute little or nothing to the immediate requirements of the sick man. Clinicians are becoming increasingly entangled in techniques."[1]

If anything, Dr. Glees has understated his case. Not only are we unable to tell the neurosurgeon exactly where to cut, but he as yet, in the blind procedure, cannot be sure of cutting where we ask. More than this, however, no one dare claim to know the mechanism of the major therapeutic effect of leucotomy. It could be a shock effect. If I now suggest that so far as we can be sure at present the advantages of the approach through the orbit are ease of performance, speed, and the lack of necessity for major anaesthesia, then its trial as an *alternative* to the standard Freeman method is certainly justifiable. I think I am right in saying that there have not yet been reports of the serious physical complications which Dr. Glees lists as possible. If they occur they will be the greatest single contraindication to the new technique. On the other hand, there may be anatomical advantages (or disadvantages), but it will take some time to collect enough information to decide.

In fact, as I am sure Dr. Glees will agree, it will be very long before we know enough about the lobes even for therapeutic purposes. Meanwhile we have to doctor our patients. I think it is in selecting the patients rather than in selecting the cuts that the greatest immediate clinical advance can be made. As a primary objective I should like to see a more careful selection of those patients who will probably benefit anyway by the blind operation, regardless of just where the cut is made. They will inevitably provide material for studying the effects of slight variations in the incision, and, more important, for even better selection of patients in the future.—I am, etc.,

Runwell, Essex. P. MACDONALD TOW.

REFERENCE

1 *Lancet*, 1949, 1, 171.

Mechanism of Memory

SIR,—The number of nerve cells in the human brain and spinal cord is fixed before birth. If any die as a result of injury or disease they cannot be replaced. In this respect grey matter differs from many of the other body cells which are replaced regularly. This deficiency carries obvious physiological disadvantages which have recently been thrown into high relief by the work of Knisely.[1] He has shown that during sickness capillaries tend to become choked with sluggish blood corpuscles for a period long enough to bring about the death of the cells they serve. He hints that patches of brain cells may frequently be lost in this manner.

It may be that the inability to replace brain cells accounts for the fact that the human intelligence reaches a limit of development at the age of 17 or thereabouts. It has occurred to me, however, that without this apparent handicap the evolution of man would probably have been impossible.

The mechanism of memory would seem to reside in certain brain cells which in some way must store the nervous impulses they receive from the sense organs. Now it is reasonable to suppose that if these cells were regularly replaced the impressions stored by them would be lost. In that case long-term memory would be impossible. Without memory there could hardly be coherent speech, and therefore there could be no communication of thought.

It may be, then, that the inability of man to regenerate brain cells has been essential to his evolution. This is admittedly academic speculation, but it may prove of interest to neurologists.—I am, etc.,

Farnham, Surrey. CHAPMAN PINCHER.

REFERENCE

1 Knisely, M. H., Bloch, E. H., Eliot, T. S., and Warner, L., *Science*, 1947, **106**, 431.

Fluorides and Dental Caries

SIR,—Dr. Alexander MacGregor's letter (Jan. 1, p. 29) admirably summarizes the present position of fluorine in relation to dental caries. But his suggestion that fluorides should not be made available to the public before adequate trials have been performed has its limitations. There cannot be, as he suggests, a similar treatment for fluorides as for penicillin, because fluorides are already available to the public in certain foods and liquids of established use. It is not unreasonable, from the U.S.A. evidence available, to suppose that the proprietary preparations containing fluorides to which he refers are designed to supply about 1 milligram of fluorine a day. From the data[1–4] on the fluorine content of drinking-water and foods one can obtain an approximate estimate as to how this quantity of fluorine can be taken in a normal manner.

	Average Fluorine Content (parts per million)	Approx. Amount to Supply 1 mg.
Drinking water:		
South Shields	1·4	1·3 pints (738 ml.)
Harrogate	0·6	3 „ (1·7 litres)
London (New River) ..	0·35	5 „ (2·8 „)
Milk, liquid	0·15	12 „ (6·8 „)
Tea, Indian	40 to 60	2–3 „ (1·1–1·7 litres) of 2% infusion
Kidney	9	4 oz. (120 g.)
Tinned salmon or sardines	8	4½ oz. (135 g.)
Bone broth	90	½ oz. (15 g.)

The water supplies chosen are comparatively rich in fluorine, since over Britain as a whole there is probably more water drunk with less than 0.3 than more than 0.3 p.p.m.[1 3] For the foods quoted there is naturally a wide variation, depending on the origin of the material (thus teas are reported to vary from 13 to 180 p.p.m.)[4] or the method of preparation (for tea and bone broth particularly).

One must agree, therefore, with Dr. MacGregor that the marketing of tablets, etc., containing fluorine is undesirable in

view of the present lack of information as to their usefulness. But it should be appreciated that the diet and water consumed by many persons has involved for a long time an intake of fluorine similar in form and quantity to that which might arise from the use of fluoride tablets in fluorine-free areas. It is suggested, therefore, that emphasis should be placed on the pursuit of practical trials—of which so far there are few signs in Britain.—I am, etc.,

Didcot, Berks. J. M. FLETCHER.

REFERENCES

1 Bromehead, C. N., *et al.*, *Lancet*, 1943, **1**, 490.
2 Weaver, R., *Proc. R. Soc. Med.*, 1948, **41**, 284.
3 Medical Research Council Memo. No. 18, 1948. London: H.M.S.O.
4 McClure, F. J., National Institute of Health Bulletin No. 172, 1939, Washington.

Lymphoblastic Leukaemia

SIR,—With reference to Dr. D. Pullen's article (Jan. 22, p. 137) on acute lymphoblastic leukaemia treated with urethane, there are several points which I should like to raise.

(1) The dosage of urethane given seems very small. I understand from perusal of the literature that the accepted dose is about 1 g. t.d.s. Creskoff, Fitz-Hugh, and Frost[1] even advise 4 g. per day. (Incidentally this and other references were omitted by Dr. Pullen.) (2) It is not my experience, nor is it that of colleagues (with whom I have discussed this matter), that remissions in acute leukaemia do not last more than a week. (3) A recent case of acute lymphatic leukaemia which came to my notice was treated with urethane, 1 g. t.d.s., for 30 days, and with repeated blood transfusions, with no clinical improvement whatever.—I am, etc.,

Liverpool. J. G. U. O. ALEXANDER.

REFERENCE

1 *Blood*, 1948, **8**, 892.

Retaining Patency of Veins

SIR,—At the University obstetrics and gynaecological clinic in Budapest the following method is used when giving transfusions in order to ensure that the vein remains patent.

The wall of the vein is gripped with fine artery forceps; a thin thread is led under the vein, and when the needle is inserted in the vein the thread serves to fix it in position. When the transfusion is finished the wall of the vein just distal to the needle is gripped with artery forceps. The thread is cut and the needle is removed. The puncture wound in the wall of the vein can now be seen, and it is seized with a pair of fine Péan's forceps and undertied with a very fine catgut. On removal of the distal pair of forceps the circulation commences without any bleeding from the ligatured part. The wound of the skin is closed with two or three stitches.

Thrombosis rarely occurs in the ligatured vein, because the undertying secures contact of intima with intima, and the vein reacts as if the wall had been very finely sutured. Before removing the needle we inject heparin into the vein to avoid thrombosis due to injury of the vessel. On one occasion the same vein was used to give five transfusions to a patient in three days.

In so far as large veins are concerned our method is not a new one, because it has been applied in surgical institutes for closing the wounds of big vessels, but it is worth considering in the case of small veins. When blood transfusions are necessary every little vein may possess vital importance, and therefore they must be treated with caution. According to our experience this method seems to fulfil the best requirements.—I am, etc.,

Budapest. GEORGES TARJAN.

POINTS FROM LETTERS

Causes of Rib Fracture

Dr. JAMES T. HAROLD (London, S.W.5) writes: Your issue of Jan. 22 contains references to several unusual causes of rib fracture. Some years ago I encountered another unusual cause. A young female stated that she had once sustained a fractured rib. Knowing her prowess as a huntress I thought it might have been acquired through horse-riding: but this noble animal was not to blame. It transpired that after some months' estrangement from her boy friend she had met him again, was lovingly embraced, and soon after experienced what she described as "a sharp pleuritic pain in the chest." Medical opinion was nonplussed for three days, when an x-ray revealed a fractured lower rib. Could this, Sir, be aetiologically ascribed to emotional trauma?

Obituary

SIR EDMUND SPRIGGS, K.C.V.O., M.D., F.R.C.P.

Sir Edmund Spriggs died on Feb. 5 at the Ruthin Castle Clinic, with which he had been associated since its creation. Sir Edmund, who had been ill for the last six months, was 77, and his death took place only a few hours after that of his wife.

Edmund Ivens Spriggs was born on Sept. 25, 1871, at Foxton, Leicestershire. He was educated at Market Harborough Grammar School and Wycliffe College, Stonehouse. A student at Firth College, which is now the University of Sheffield, he obtained a science scholarship at Guy's Hospital Medical School in 1892. There he graduated M.B. with honours in 1896, proceeding to the M.D. in 1898. In that year Spriggs succeeded F. Gowland Hopkins as demonstrator of physiology under E. H. Starling and afterwards under M. S. Pembrey. Later he was also demonstrator of pharmacology, and he took the M.R.C.P. in 1899. In 1901, while holding the Gull Research Studentship, he worked in Kossel's laboratory at Heidelberg and published then his first paper on peptic activity. Returning to London, he was appointed in 1902 assistant physician to what is now the London Chest Hospital, and in 1903 to the Victoria Hospital for Children, Tite Street. At this time Spriggs was working on diabetes, and he published (with A. P. Beddard and M. S. Pembrey) work confirming the earlier observations of Minkowski and of Kraus.

[*Elliott and Fry, Ltd.*

In the following year, there being no near prospect of a vacancy at Guy's Hospital, Spriggs was appointed assistant physician at St. George's Hospital. He was elected F.R.C.P. in 1905, and in 1906 gave the Oliver-Sharpey lectures on "The bearing of metabolism experiments upon the treatment of disease." Studies of the metabolism of creatinine, made when he was dean of St. George's Hospital Medical School, were followed in 1909 by his first paper on the treatment of gastric ulcer by immediate feeding, the diet being adapted from that of Lenhartz. This method, with modifications, Spriggs used in suitable cases from that time onwards.

At the end of 1911 Edmund Spriggs had an illness which continued for fifteen months. He was advised not to return to London and was offered by Dr. David Lawson the post of senior physician at a new clinic for gastric disorders. This was accepted on the stipulation that the range of work should comprise internal medicine as a whole and that the clinic should be provided with suitable laboratories and scientific staff. The new clinic was conducted for ten years at Duff House, Banff, Scotland, and then moved to Ruthin Castle, North Wales. In 1917–18 Spriggs acted as medical adviser to the Ministry of Food, and was a member of the rationing committee. After the war he wrote the first of a succession of papers with O. A. Marxer on diverticulosis and diverticulitis. In 1923, with D. V. Pickering and A. J. Leigh, Spriggs recorded one of the earliest cases, if not the earliest in this country, of severe diabetes treated with insulin. A few years later (with J. H. Anderson) he was able to describe the recovery of the first two cases of pernicious anaemia treated in this country with the Minot-Murphy liver diet. Other papers which appeared later had been presented as opening addresses at medical meetings at Winnipeg in 1930 and at Wellington, New Zealand, in 1937.

In the Croonian Lectures in 1933 Spriggs reviewed 500 cases of headache. As recently as 1943 he wrote for the *Quarterly Journal of Medicine* a paper on polyps of the stomach and polypoid gastritis.

In a long and busy life Sir Edmund, as he became in 1935, published over a hundred papers. Out of doors his recreations were walking, fishing, shooting, and the breeding and training of retrievers; his Yellow Labradors competed with success in field trials.

He became a J.P. in Banffshire in 1919 and in Denbighshire in 1929. His two sons are both doctors, and the sympathy of all his friends and colleagues will be extended to them.

SIR FREDERIC J. WILLANS,
K.C.V.O., M.R.C.S., L.R.C.P.

Sir Frederic J. Willans died at his home in Sandringham on Jan. 27. He had held the post of surgeon-apothecary to his Majesty's Household at Sandringham since 1924, and had also been surgeon-apothecary to Queen Alexandra.

Frederic Jeune Willans, eldest son of the late Dr. W. Blundell Willans, was born at Much Hadham, Hertfordshire, in 1884. He was educated at Framlingham College, and at Durham University and the London Hospital, qualifying M.R.C.S., L.R.C.P. in 1910. Except for four years' service with the R.A.M.C. during the 1914–18 war, the whole of his active career was spent in general practice at Sandringham. He became surgeon-apothecary after the death of the first holder of the appointment to King Edward VII, Sir Alan Manby, whose assistant he was. In the course of his long and devoted service Willans had probably been consulted by members of the royal family more often than any other member of the profession; on many occasions he was the first medical man to be called in attendance. He was awarded the M.V.O. in 1923, promoted to C.V.O. in 1925, and created K.C.V.O. in 1933.

Sir Frederic was very popular among his many friends and patients in the Sandringham district, and although he had not been in good health for the past year his death after only a week's illness came as a shock to many. Always an active member of the British Medical Association, he was chairman of the West Norfolk Division in 1925–6 and chairman of the Norfolk Branch in 1936–7. During the recent war he presided over the King's Lynn district medical board. He married, in 1916, Wynefred, the only daughter of the late Sir Alan Manby. There were no children.

An intimate friend has written: Not every man who has walked a hospital "can walk with kings, nor lose the common touch." Called very early in his medical career to minister at the bedside of royalty, Frederic Willans was nevertheless beloved by all the people of the villages on the estate which has for its centre Sandringham House. A keen cricketer, he once captained the Sandringham side. He was also an excellent tennis player, and he enjoyed his golf almost to the last. He was, too, an ardent philatelist. A warden of his parish church, he took a keen interest in the life of West Newton, where he lived. He had a real sense of humour, and children loved him. His heart, however, was in the work to which he gave himself with unsparing energy until a few days before his death. Since last summer he had known the serious nature of the condition which was to prove fatal, though with characteristic bravery and thought for others he concealed this from even his most intimate friends. In the country it sometimes happens that a man lives and works for so long in one place, and becomes so familiar a part of the village scene, that it seems he must always be there. His neighbours will find it difficult to imagine life without him. His tall, spare figure will be sorely missed by many, and especially in those hours of joy and sorrow when men and women find in their doctor the strength and help that no one else can give. Every agricultural worker knew that "Sir Frederic" would come to his aid at any hour of the day or night and with painstaking care give him as much attention as he gave to the highest in the land. The large congregation at his funeral was a remarkable testimony to the esteem and affection in which he was held among all sorts and conditions in the neighbourhood where he had practised for thirty-five years.

F. H. A. MARSHALL, C.B.E., F.R.S.

Dr. F. H. A. Marshall, who was for many years reader in agricultural physiology in the University of Cambridge, died suddenly after an operation on Feb. 5. Dr. Marshall, who was 70, had lectured on the physiology of reproduction to several generations of medical students at Cambridge.

Francis Hugh Adam Marshall was born at High Wycombe on July 11, 1878, and was educated at St. Mark's School, Windsor, and privately. He went up to Christ's College, Cambridge, in 1896 from University College, London. He took the Natural Science Tripos three years later and then went to Edinburgh to work as a research student with Professor Cossar Ewart. Later he was Carnegie Fellow and lecturer on the physiology of reproduction in the University, and it was only in 1908 that he returned to Cambridge as lecturer in agricultural physiology. He was a proctor in 1911–12, and subsequently served on the council of the Senate. Dr. Marshall continued as lecturer in physiology for more than thirty-five years until 1943, and for a short time he succeeded Professor T. B. Wood as director of the Institute of Animal Nutrition. He was successively fellow, tutor, dean, and, in 1940, vice-master of Christ's College. Dr. Marshall assisted Cossar Ewart with his experiments on telegony, and this stimulated his interest in the physiology of reproduction. He went on to study the oestrous cycle in sheep, in the ferret, and in the dog. The last of these studies led to the preparation of a paper written in collaboration with Professor W. A. Jolly and entitled "The Ovary as an Organ of Internal Secretion." Other papers were concerned with the effects of the removal and transplantation of the ovaries and with the part played by the Graafian follicle in the initiation of oestrus. Marshall's *The Physiology of Reproduction* was first published in 1910; the second and much enlarged edition appeared in 1922, and the third edition was published only last year.

H. A. RICHARDS, M.R.C.S., D.A.

Dr. Hugh Richards, consulting anaesthetist to King's College Hospital, died on Jan. 22 while on holiday at Grenada, British West Indies. Educated at Rossall and Clare College, Cambridge, he qualified from King's College Hospital in 1913. At the beginning of the 1914–18 war he was holding an appointment as ship surgeon in the Orient line, and he continued for a time as surgeon in charge of troopships. Later he went to France, and until his demobilization served in a casualty clearing station. There he first became interested in anaesthetics. In 1921 he was appointed to the honorary staff of King's College Hospital as an anaesthetist, and in 1935 he became senior anaesthetist, which post he held until his retirement in 1946. He was given the D.A. in 1936, and only last year was awarded the fellowship of the recently formed Faculty of Anaesthetists of the Royal College of Surgeons. He was also an active member of the Royal Society of Medicine, acting in the Section of Anaesthetists as secretary and later as president. In September, 1939, he gave up his private practice to take up a full-time appointment in the Emergency Medical Service, and throughout the war he worked at Horton Emergency Hospital, where he not only took a full share in the routine work but was largely responsible for the organization of the anaesthetic services and continued to teach students and to train residents.

Throughout his life Hugh Richards saw only the right way and the wrong way. He adhered unhesitatingly to the principles he had laid down for himself and expected others to do the same. His bluff and uncompromising manner prevented some from looking beneath the surface, but those who did so found a character of sincerity and great loyalty. Once given, his support was never withdrawn from one he found worthy of friendship. He was essentially a King's man, and he served his hospital ungrudgingly from his time as a student until his retirement. He gave ether in a masterly fashion, and with it he obtained results which he claimed, with some justification, were equal to those of any other method; it had served him as a friend for many years and he was not easily led away by more recent methods. As a teacher he had exceptional ability, and he taught with zeal. His instruction was firm and dogmatic, and he taught mainly those fundamental principles which the undergraduate should know. He was intolerant of stupidity

and lack of attention to detail, and did not hesitate to use biting sarcasm; but this was only a part of his well-tried method. His students learnt fast, and when they had finished their course with him they had a firm foundation on which to build in the future. He had a great interest in all student activities; during his early years on the staff he had much to do with reviving the hockey club, and he continued to support both it and the rugby football club until he retired. He was for many years treasurer, and for the last five years president, of the students' clubs and societies union, and his able management served this organization well.

Dr. Richards married just before he left the staff, and his friends thought he was assured of many years of contented retirement. By his unexpected death many of his colleagues have lost a generous friend and King's College Hospital has lost one of its most loyal supporters.

Medico-Legal

MEASLES IN A HOTEL

[FROM OUR MEDICO-LEGAL CORRESPONDENT]

A prospective guest who had booked rooms for his family cancelled his booking when he heard that a child in the hotel had measles. The proprietor sued him for breach of contract, claiming £72, but the learned judge of Bournemouth County Court, Judge A. H. Armstrong, ruled that the prospective guest had been right and dismissed the suit.[1] A guest at a hotel is an invitee, and therefore has a right to be secured against harm. The duty to make premises safe is even more stringent when a child is a possible sufferer.

[1] *Evening Standard*, Nov. 24, 1948.

Universities and Colleges

UNIVERSITY OF OXFORD

In a Congregation on Jan. 20, the following medical degrees were conferred:

M.D.—F. Hampson.
M.B.—T. Bell, D. G. Jamison, *J. T. H. Green, *T. H. C. Lewis, *A. H. Campbell.

* *In absentia.*

UNIVERSITY OF CAMBRIDGE

Sir Edward Mellanby, F.R.S., Secretary of the Medical Research Council, will deliver a lecture in the Physiological Laboratory Theatre on Friday, Feb. 25, at 5 p.m. His subject is "An Experimental Investigation into a Condition of Widespread Nerve Degeneration." The lecture is open to members of the University without fee.

UNIVERSITY OF MANCHESTER

The University Council has appointed R. S. F. Schilling, M.D., to be Reader in Occupational Health.

UNIVERSITY OF BRISTOL

The following candidate has been approved at the examination indicated:

M.D.—J. B. Brierley.

ROYAL COLLEGE OF PHYSICIANS OF EDINBURGH

At a meeting of the College, held on Feb. 1, with Dr. W. D. D. Small in the chair, the following were elected to the Fellowship: R. G. McInnes (Oxford), K. M. Morris (Edinburgh), W. J. Burns (Edinburgh).

The Diploma of Membership was conferred upon the following: W. G. Greene (Chester), F. O'D. Finigan (London), R. Natarajan (Deolali, India), Siva R. K. Padmavati (Coimbatore, India), J. M. Barber (London), F. G. Pattrick (King's Lynn), A. M. Merriweather (Bechuanaland), R. E. Beamish (Winnipeg), R. P. Gillespie (Edinburgh), S. P. Hall-Smith (Hove), J. R. Mackenzie (Carluke), I. H. Stokoe (Edinburgh), R. M. Marquis (Edinburgh), D. H. Reilly (Quebec), J. Williamson (East Kilbride), A. W. B. Cunningham (Edinburgh), R. G. Mitchell (Edinburgh), Alwyce B. Gordon (Sydney), R. A. Bustamante (London), G. L. Brinkman (London).

Medical Notes in Parliament

Remuneration for Temporary Residents

On Feb. 3 Colonel STODDART-SCOTT asked the Minister of Health if any payments had yet been made to the doctors in the National Health Service for the treatment of temporary residents, visitors, holiday-makers, foreigners, and those patients not on a doctor's list.

Mr. BEVAN replied that no payments had yet been made for the treatment of temporary residents, visitors, holiday-makers, and foreigners. The principles on which such payments should be made were under discussion with the medical profession. It was contemplated that payments in respect of the period from July 5 to Dec. 31, 1948, should be made on March 31 next. The amount of these payments was not yet known. So far as he knew, this country was at present the only one which provided such a service for its visitors.

Refresher Courses

During the period July 5, 1948, to Jan. 31, 1949, payments in respect of refresher courses under Section 48 of the National Health Service Act amounted to £1,335. In the same period payments amounting to £1,982 were made in respect of refresher courses for ex-Service doctors and dentists. There were in addition a large number of residential and other appointments in hospital for ex-Service doctors.

Fees for Sight-testing

Replying on Feb. 3 to Sir GEORGE HARVIE WATT, who asked what fees were payable to persons included in the ophthalmic list for services rendered under the National Health Service, Mr. BEVAN replied that the fees were:

	£	s.	d.
Ophthalmic medical practitioners, sight testing fee ..	1	11	6
Ophthalmic opticians, sight-testing fee		15	6
Ophthalmic or dispensing optician, dispensing fee ..	1	5	0

He added that any proposals to adjust these amounts were matters for discussion with the professional organizations as regards ophthalmic medical practitioners and with the Optical Whitley Council as regards opticians.

Radioactive Effluent

Mr. BOYD-CARPENTER asked on Feb. 3 what steps were taken to check the degree of radioactivity of material in the River Thames resulting from the discharge of radioactive effluent from Harwell. Mr. BEVAN explained that each batch of effluent was tested and certified at Harwell before discharge into the Thames and the total amount of radioactive material discharged was always known at Harwell and by the Ministry of Health. The amount which could be discharged with safety had been determined on the recommendations of a scientific subcommittee of the Medical Research Council. The amounts so far discharged had been much below that safety limit, and would probably be too small, after dilution with river water, to be detected at all. Tests of the river water would not therefore at present be of any value.

Milk Bill

At a meeting of the Parliamentary Medical Group at the House of Commons on Feb. 3 the officers of the Group were reappointed for 1949. The Milk (Special Designations) Bill was discussed with a deputation from the British Medical Association, and it was agreed to seek certain amendments. The Bill has already passed through the Committee and Report stages in the House of Lords.

Single-handed Doctor

Mr. MARTIN LINDSAY asked on Feb. 3 how many people received E.C./Reg.107, dated Jan. 14, from the Birmingham Executive Council informing them that they must change their doctor.

Mr. BEVAN said in reply that the executive council's letter of Jan. 14 was sent to 3,196 people. They were all on the list of a single-handed doctor whose total list amounted to 8,279, or over double the number agreed with the medical profession as the maximum which could be properly attended by one doctor. The action was taken in consultation with the doctor concerned. Mr. Bevan saw no reason to question it.

Nursing Staff

Asked on Feb. 3 to give the number of nursing staff employed in hospitals at any convenient date in 1938, 1946, and 1948, Mr. BEVAN furnished these figures:

September, 1938—96,800 (including 800 part-time).
September, 1946—111,600 (including 2,600 part-time).
September, 1948—132,000 (including 19,000 part-time).

He added that the number of hospital beds unstaffed in September, 1948, was 57,000, or about one-ninth of the total number of beds.

Parliamentary Secretary.—Mr. ARTHUR BLENKINSOP, hitherto Parliamentary Secretary to the Ministry of Pensions, has been appointed to be Parliamentary Secretary to the Ministry of Health in place of Mr. L. J. Edwards, who becomes Parliamentary Secretary to the Board of Trade.

EPIDEMIOLOGICAL NOTES

Influenza

There were 37 deaths from influenza in the great towns of England and Wales in the week ended Jan. 29, as against 45 in the preceding week. In the first four weeks of 1949 the deaths were, on the whole, lower than they had been in any previous year except 1948.

There have been several reports of scattered outbreaks of influenza in camps and residential schools. This appears to be true influenza, and virus has been isolated from some cases. Generally speaking the disease is usually mild, with fever lasting about four days. The current English strain has not yet been finally identified, but one French and two Dutch strains seem to be identical serologically and related to, but not identical with, the English 1947 A. All these strains are remotely related to the PR8 strain of virus A.

Discussion of Table

In *England and Wales* increases were reported in the notifications of scarlet fever 322, whooping-cough 117, diphtheria 39, and dysentery 34. There was a decrease in the incidence of measles 668 and of acute pneumonia 134.

The decreased incidence of measles was due to the experience of the northern part of the country; in the south an increased incidence was recorded. The largest decreases in the notifications of measles were Lancashire 398, Yorkshire West Riding 228, and Gloucestershire 198; the largest increases were Southampton 251, Essex 119, and Surrey 60.

A small rise in the incidence of scarlet fever occurred throughout the country; the largest rises were Lancashire 108 and Yorkshire West Riding 55. With a few exceptions the local returns for whooping-cough showed only slight fluctuations; there was a rise of 37 in Surrey and a fall of 40 in Leicestershire.

The chief feature of the returns of diphtheria was an increase of 21 in Yorkshire West Riding; this was mainly due to an outbreak affecting 15 persons in Bradford C.B. Notifications of diphtheria in the south-eastern counties rose from 4 to 11.

An outbreak of dysentery with 5 cases was notified from Oxford, Bullingdon R.D. The largest returns for dysentery were London 41 (St. Pancras 31); Lancashire 24 (Liverpool C.B. 8, Oldham C.B. 8); and Yorkshire West Riding 8.

There were multiple notifications of acute poliomyelitis in London 3 (Islington 2); Middlesex 2; Gloucestershire (Bristol C.B. 2); Nottinghamshire (Basford R.D. 2); Lancashire 2; and Yorkshire West Riding 2.

In *Scotland* there were decreases in the notifications of whooping-cough 56 and measles 45, with a rise in the incidence of scarlet fever 15 and diphtheria 13. The notifications of scarlet fever declined by 17 in the western area but rose in the remaining areas.

In *Eire* the notifications of diarrhoea and enteritis increased by 17 and the notifications of measles declined by 16. The increase in cases of diarrhoea and enteritis was due to the experience of Dublin C.B.

In *Northern Ireland* an increase was recorded in the notifications of scarlet fever 16 and measles 12. The incidence of measles rose in Belfast C.B. 19 and Antrim County 15, and fell in Tyrone County 31.

Week Ending January 29

The notifications of infectious diseases in England and Wales during the week included: scarlet fever 1,191, whooping-cough 2,857, diphtheria 141, measles 11,656, acute pneumonia 935, cerebrospinal fever 45, acute poliomyelitis 20, dysentery 60, paratyphoid 2, and typhoid 3.

No. 3

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended Jan. 22.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for: (a) England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland.
Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for: (a) The 126 great towns in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.
A dash — denotes no cases; a blank space denotes disease not notifiable or no return available.

Disease	1949 (a)	(b)	(c)	(d)	(e)	1948 (Corresponding Week) (a)	(b)	(c)	(d)	(e)
Cerebrospinal fever	24	4	25	1	1	47	5	21	2	—
Deaths		—	1				1	—		
Diphtheria	131	5	47	5	4	199	25	60	14	8
Deaths	3	—	—	—	—	2	—	—	—	—
Dysentery	104	41	36	—	4	131	7	43	1	—
Deaths				—	—				—	—
Encephalitis lethargica, acute	1	—	—	—	1	—	—	1	—	—
Deaths		—					—			
Erysipelas			40	4	5			55	15	6
Deaths		—					—			
Infective enteritis or diarrhoea under 2 years				49					24	
Deaths	34	—	7	3	1	46	5	5	2	—
Measles*	10,254	357	63	41	163	3,457	284	1023	121	14
Deaths†			1	—	1			3	1	—
Ophthalmia neonatorum	39	3	10	—	1	64	5	17	1	—
Deaths										
Paratyphoid fever	1	—	2 (B)	1 (B)	—	7	2	—	—	—
Deaths	—	—	—	—	—	—	—	—	—	—
Pneumonia, influenzal	1,050	45	16	13	9	780	69	7	4	4
Deaths (from influenza)‡	45	3	18	2	—	18	5	2	—	—
Pneumonia, primary			472	33				278	31	
Deaths	314	51		18	12	454	47		12	10
Polio-encephalitis, acute	2	—				3	—			
Deaths										
Poliomyelitis, acute	26	3	3	1	—	35	4	3	—	—
Deaths§	3	—				3	—			
Puerperal fever		—	10				1	7		1
Deaths										
Puerperal pyrexia‖	96	9	13	1	1	110	12	10	2	2
Deaths		—					—			
Relapsing fever	—	—			—	—	—			—
Deaths										
Scarlet fever	1,311	77	288	92	60	1,847	127	350	39	45
Deaths†			—	—	—			—	—	—
Smallpox	—	—	—	—	—	—	—	—	—	—
Deaths				—	—				—	—
Typhoid fever	3	—	—	—	—	6	1	1	4	1
Deaths	—	—	—	—	—	—	—	—	—	—
Typhus fever	—	—	—	—	—	—	—	—	—	—
Deaths				—	—				—	—
Whooping-cough*	2,942	195	248	66	67	2,547	158	39	42	4
Deaths	14	1	—	1	—	8	1	—	2	1
Deaths (0–1 year)	374	39	56	30	12	385	60	53	23	10
Infant mortality rate (per 1,000 live births)										
Deaths (excluding still-births)	5,881	944	833	222	141	5,222	788	685	215	156
Annual death rate (per 1,000 persons living)			16·7	13·8				13·8	13·5	
Live births	7,754	1267	953	405	283	8,421	1319	1030	372	264
Annual rate per 1,000 persons living			19·1	25·1				20·8	23·3	
Stillbirths	234	30	19			231	24	21		
Rate per 1,000 total births (including stillborn)			20					20		

* Measles and whooping-cough are not notifiable in Scotland, and the returns are therefore an approximation only.
† Deaths from measles and scarlet fever for England and Wales, London (administrative county), will no longer be published.
‡ Includes primary form for England and Wales, London (administrative county), and Northern Ireland.
§ The number of deaths from poliomyelitis and polio-encephalitis for England and Wales, London (administrative county), are combined.
‖ Includes puerperal fever for England and Wales, Eire, and Northern Ireland.

Medical News

Lord Webb-Johnson

Lord Webb-Johnson, President of the Royal College of Surgeons of England, has been made an Honorary Freeman of the Worshipful Company of Barbers, whose Master is Dr. G. G. Macdonald. The ceremony conferring the freedom took place at a recent meeting of the Court.

N.A.P.T. Colonial Scholarships

The National Association for the Prevention of Tuberculosis has decided to offer six further scholarships for postgraduate study in tuberculosis in Britain during 1949. They will be open to doctors and other medical personnel of either sex throughout the British Colonal Empire and the Sudan. The successful candidates will come to Britain for about six months to study tuberculosis in its widest aspects—preventive, clinical, administrative, and social. The awards are as follows: (*a*) two scholarships to doctors who either possess qualifications registrable in the United Kingdom (value of scholarships, £120 each) or are graduates of Colonial Medical Schools (value of scholarships, £100 each); (*b*) four scholarships (value £80 each) to matrons, nurses, health visitors, or members of Colonial Sanitary Departments. The successful candidates will be granted allowances to cover lodging and subsistence expenses from Colonial Government funds, and the details of their training during the tenure of the scholarship will be supervised by the N.A.P.T. Travelling expenses, purchase of books, and other incidental expenditure will fall to be met by scholars out of their scholarship money. Application, which should be made through heads of departments, will be forwarded to the Colonial Office, which will make recommendations to the Council of the N.A.P.T. Candidates should submit applications in time for them to reach the Colonial Office by May 1.

Infected Meat

The National Veterinary Medical Association has issued a warning to the public against buying uncooked meat at pet-food shops. Some of the meat may have been condemned as unfit for human consumption on account of its being infected with tuberculosis or other disease. There is an obvious danger of dogs and cats contracting the disease from this source unless the meat is thoroughly cooked; and the danger to animal owners handling such meat before it is cooked is said to be by no means negligible. Where such meat has to be handled raw, it is advisable to wash the hands thoroughly afterwards. One City Corporation, on the advice of its Chief Veterinary Officer, has already obtained from Parliament authority to make by-laws to protect the public from this danger.

Hospital Catering Training Centre

A training centre for training in all branches of hospital catering is to be established under the auspices of King Edward's Hospital Fund at St. Pancras Hospital (now part of University College Hospital). The centre will provide meals for patients and staff in the hospital, be a model catering department in layout, organization, and equipment, and include all modern labour-saving devices. It will be at least six or twelve months before it is ready to take trainees. Mr. C. C. A. Gibbs has been appointed officer-in-charge of the centre. He was formerly catering officer to St. Mary's Hospital.

New Pharmaceutical Preparations

In order to help medical practitioners and pharmacists the *Pharmaceutical Journal* has started a service giving information about new proprietary and non-proprietary preparations. For two guineas a year the subscriber receives cards on which the preparations are described—their composition, indications for use, dosage, packing and price, and suppliers. References in the medical press on the use of some of the preparations are included. A filing cabinet for the cards is supplied. Information may be obtained from the *Pharmaceutical Journal* (Department N.P.), 33, Bedford Place, London, W.C.1.

National Insurance Scheme

Employed and self-employed new entrants to the National Insurance scheme on July 5, 1948, who were ill during the first six months of the scheme and, because they were not entitled to sickness benefit or for some other reason, did not notify the local National Insurance Office of their incapacity are advised by the Ministry of National Insurance to do so as soon as possible. If the local National Insurance Office is notified of incapacity, contributions can be excused in certain circumstances, even though the insured person is not entitled to benefit. Until a contribution is excused, however, an insured person remains liable to pay a contribution for each week he is sick and not receiving benefit.

Ipswich and Colchester Rahere Club

At a meeting held at Colchester on Jan. 8 under the chairmanship of Dr. Penry Rowland a Rahere Club was formed, open to old students of St. Bartholomew's Hospital in Suffolk and North Essex. The next dinner will be held at Ipswich in October. The secretary, Dr. W. Radcliffe, Wivenhoe, near Colchester, will be glad to hear from any old Bart's students in the district who may be interested.

COMING EVENTS

Liverpool University Medical Students' Society

The annual dinner of the Liverpool University Medical Students' Society will be held at Exchange Hotel, Liverpool, on Wednesday, Feb. 23, at 7 for 7.30 p.m., when the guest of honour will be Sir William Gilliatt.

Swiss Medical Congress

The 17th Annual Congress of the Swiss Society of Internal Medicine will be held at Lugano on May 6–8. Information may be obtained from Dr. O. Gsell, Kantonsspital St. Gall, Switzerland.

International Congress of Electroencephalography

The second International Congress of Electroencephalography will be held in Paris on Sept. 1, 2, and 3, and on one day of the following week there will be a joint meeting with the International Neurological Congress. Full particulars may be obtained from the British representative on the organizing committee of the congress, Dr. W. Grey Walter, Burden Neurological Institute, Stoke Lane, Stapleton, Bristol.

N.A.P.T. Jubilee

The National Association for the Prevention of Tuberculosis will celebrate its jubilee this year by holding a Commonwealth and Empire Health and Tuberculosis Conference on July 5–8. The provisional programme is as follows: Tuesday, July 5: "Tuberculosis as a World Problem—Trends in the Modern Treatment for Tuberculosis, including Streptomycin and P.A.S." Wednesday, July 6: "Regional, County, and County Borough Tuberculosis Schemes—Organization of Comprehensive Tuberculosis Schemes in a British Colony." Thursday, July 7: "Problems in the Prevention and Detection of Tuberculosis, (*a*) Tuberculosis among Nurses and Students, (*b*) The Policy of B.C.G. Administration—Psychological and Social Readaptation of Chronic Disease in Industry." Friday, July 8: "Protection from Bovine Tuberculous Infection." Speakers will include: Dr. Marc Daniels, Dr. T. A. Lloyd Davies, Dr. John Francis, Professor Jorgen Lehmann, Dr. Geoffrey Marshall, Dr. John G. Scadding, Mr. C. Price Thomas, Dr. Charles Wilcocks, Dr. A. B. Williamson, Dr. J. Greenwood Wilson. The fees are three guineas for four days, one guinea for a single day or session. Particulars may be obtained from the N.A.P.T., Tavistock House North, Tavistock Square, London, W.C.1.

SOCIETIES AND LECTURES

Monday

LONDON: UNIVERSITY COLLEGE.—At Physiology Theatre, Gower Street, London, W.C., Feb. 14, 4.45 p.m. "*The Ultracentrifuge and Electrophoresis Apparatus in Protein Research*," by Dr. P. Johnson, Ph.D.

MEDICAL SOCIETY OF LONDON, 11, Chandos Street, Cavendish Square, London, W., Feb. 14, 8.30 p.m. "*Old Age*." Discussion to be introduced by Dr. Trevor Howell and Mr. W. Sampson Handley.

Tuesday

INSTITUTE OF DERMATOLOGY, 5, Lisle Street, Leicester Square, London, W.C.—Feb. 15, 5.15 p.m. "*Diseases of the Nails*," by Dr. I. Muende.

INSTITUTE OF UROLOGY.—At St. Paul's Hospital, Endell Street, London, W.C., Feb. 15, 11 a.m. "*Urethritis due to Protozoa, Metazoa and Fungi*," by Dr. A. H. Harkness.

LONDON: UNIVERSITY COLLEGE.—At Physiology Theatre, Gower Street, London, W.C., Feb. 15, 5.15 p.m. "*Anatomical and Histological Considerations*," by Dr. A. Schweitzer.

ROYAL COLLEGE OF PHYSICIANS OF LONDON, Pall Mall East, S.W.—Feb. 15, 5 p.m. "*Tuberculosis in Post-war Europe*," Milroy Lecture by Dr. Marc Daniels.

Wednesday

INSTITUTE OF DERMATOLOGY, 5, Lisle Street, Leicester Square, London, W.C.—Feb. 16, 5 p.m. "*X-ray Technique*," by Dr. C. W. McKenny.

INSTITUTE OF UROLOGY.—At St. Paul's Hospital, Endell Street, London, W.C., Feb. 16, 11 a.m. "*Urethritis due to Protozoa, Metazoa and Fungi*," by Dr. A. H. Harkness.

PHARMACEUTICAL SOCIETY OF GREAT BRITAIN, 17, Bloomsbury Square, London, W.C.—Feb. 16, 7.30 p.m. "*The National Formulary, 1949*," by Mr. T. C. Denston, B.Pharm., Ph.C., F.R.I.C.

ROYAL MICROSCOPICAL SOCIETY.—At B.M.A. House, Tavistock Square, London, W.C., Feb. 16, 5.30 p.m. Ordinary meeting. "*Reflecting Microscopes—Past, Present, and Future*," by Dr. R. Barer.

Thursday

EDINBURGH CLINICAL CLUB.—At B.M.A. Scottish House, 7, Drumsheugh Gardens, Edinburgh, Feb. 17, 8 p.m. *"Functional Disorders of Childhood,"* by Dr. J. L. Henderson.

EDINBURGH ROYAL INFIRMARY.—Feb. 17, 5 p.m. *"Incoordinate Uterine Action."* Honyman Gillespie Lecture by Dr. Clifford Kennedy.

FACULTY OF RADIOLOGISTS.—At British Institute of Radiology, 32, Welbeck Street, London, W., Feb. 17, 8.15 p.m. Joint meeting with British Institute of Radiology and R.S.M. Section of Radiology. *"The Physical, Cytological, and Medical Aspects of Protection from Ionizing Radiations with Special Reference to the Use of High Voltage X Rays and Radio-isotopes."* Discussion to be opened by Sir E. Rock Carling, Dr. Frank Ellis, and Professor W. V. Mayneord.

INSTITUTE OF UROLOGY.—At St. Paul's Hospital, Endell Street, London, W.C., Feb. 17, 11 a.m. *"Traumatic Urethritis,"* by Dr. A. H. Harkness.

LONDON UNIVERSITY.—At Large Lecture Theatre, St. George's Hospital Medical School, Hyde Park Corner, London, S.W., Feb. 17, 4.30 p.m. Lecture-demonstration: *"Psychiatry."*

LONDON: UNIVERSITY COLLEGE.—At Anatomy Theatre, Gower Street, London, W.C., Feb. 17, 1.15 p.m. *"The New Philosophy of Science,"* by Dr. G. Burniston Brown.

ROYAL COLLEGE OF PHYSICIANS OF LONDON, Pall Mall East, S.W.—Feb. 17, 5 p.m. *"Tuberculosis in Post-war Europe,"* Milroy Lecture by Dr. Marc Daniels.

ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE.—At 26, Portland Place, London, W., Feb. 17, 7.30 p.m. *"The Epidemiology of Yellow Fever in Central Africa,"* by Dr. A. F. Mahaffy. A discussion will follow.

SOCIETY OF MEDICAL OFFICERS OF HEALTH.—At B.M.A. House, Tavistock Square, London, W.C., Feb. 17, 5.30 p.m. *"Can the M.O.H. Help to Prevent Accidents in the Home?"* Paper by Dr C. A. Boucher, to be followed by a discussion.

Friday

BIOCHEMICAL SOCIETY.—At St. Thomas's Hospital Medical School, London, S.E., Feb. 18, 2 p.m. 274th meeting. Papers will be read.

FACULTY OF RADIOLOGISTS.—Joint meeting with British Institute of Radiology and R.S.M. Section of Radiology, Feb. 18. Discussion: *"The Physical, Cytological, and Medical Aspects of Protection from Ionizing Radiations with Special Reference to the Use of High Voltage X Rays and Radio-isotopes."* (1) At Royal College of Surgeons of England, Lincoln's Inn Fields, London, W.C., 2.15 p.m. To be opened by Drs. J. R. Nuttall, J. F. Loutit, and A. Glucksmann. (2) At Royal Society of Medicine, 1, Wimpole Street, London, W., 8.15 p.m. To be opened by Sir E. Rock Carling and Drs. Katharine Williams and W. G. Marley.

LONDON CHEST HOSPITAL, Victoria Park, E.—Feb. 18, 5 p.m. *"The Place of Ear, Nose, and Throat Surgery in the Treatment of Chest Diseases,"* by Mr. J. W. S. Lindahl.

MIDDLESEX COUNTY MEDICAL SOCIETY.—At Edgware General Hospital, Edgware, Middlesex, Feb. 18, 3 p.m. General meeting.

ROYAL MEDICAL SOCIETY, 7, Melbourne Place, Edinburgh.—Feb. 18, 8 p.m. *"Lobar Pneumonia,"* by Mr. G. F. A. Howie.

WEST LONDON MEDICO-CHIRURGICAL SOCIETY.—At South Kensington Hotel, 41, Queen's Gate Terrace, London, S.W., Feb. 18, 7.15 for 7.30 p.m. Dinner meeting 8.30 p.m. *"? Guild for Doctors,"* by Lord Horder.

Saturday

KENT PAEDIATRIC SOCIETY.—At Royal Star Hotel, Maidstone, Feb. 19, 2.30 p.m. *"The Children's Act,"* by Dr. Dorothy Makepeace and Miss Harvie.

BIRTHS, MARRIAGES, AND DEATHS

BIRTHS

Arnott.—On Jan. 23, 1949, in London, to Dr. Ruth Arnott (née Burt), wife of Dr. D. C. Arnott, twin sons.

Baker.—On Feb. 3, 1949, at County Hospital, Hereford, to Bobbie (née Gelder), wife of Dr. W. H. J. Baker, a daughter.

Jones.—On Jan. 30, 1949, at Swiss Cottage, Llanelly, to Margaret (née Penny), wife of Dr. Derek Hayman Jones, a daughter.

Lamming.—On Jan. 10, 1949, to Olive (née Callow), wife of Robert L. Lamming, F.R.C.S., Douglas, Isle of Man, a daughter.

Pitt.—On Jan. 12, 1949, in Watford, to Penelope (née Reynolds), wife of Dr. N. P. Pitt, a daughter.

Tate.—On Feb. 1, 1949, at Nottingham Hospital for Women, to Margaret (née Bailey), wife of Malcolm Tate, B.M., of Bredon, Oak Tree Lane, Mansfield, a son—Philip.

MARRIAGE

Balint—Gibson.—On Jan. 15, 1949, at Goring-by-Sea, Worthing, John Balint, M.B., B.Ch., to Jean Gibson, M.R.C.S., L.R.C.P.

DEATHS

Bateman.—On Jan. 30, 1949, at Chester Military Hospital, Albert Brooke Bateman, V.D., M.B., Ch.B., B.D.S., L.D.S. R.C.S., Surgeon Commander (D), R.N.V.R.

Bertram.—On Feb. 2, 1949, at Nantbank, Taynuilt, Argyll, William Darling Bertram, M.B., Ch.B., D.P.H., aged 47.

Bleasby.—On Feb. 1, 1949, at Sunderland General Hospital, Doris Eliza Nisbet Bleasby, L.R.C.P.&S.Ed., of Glasgow, aged 29.

Galbraith.—On Feb. 1, 1949, at Ross Memorial Hospital, Dingwall, James John Galbraith, M.D., D.P.H., J.P., aged 71.

Haldin-Davis.—On Feb. 2, 1949, at Greens End, Forest Row, Sussex, H. David Haldin-Davis, M.D., F.R.C.P., F.R.C.S., late of 52, Harley Street, London, W.

Hayles.—Recently, Alfred William Hayles, M.R.C.S., of Pontnewydd, near Newport, Mon., aged 85.

Any Questions?

Correspondents should give their names and addresses (not for publication) and include all relevant details in their questions, which should be typed. We publish here a selection of those questions and answers which seem to be of general interest.

Hereditary Influence of Epilepsy

Q.—*Is there any evidence that the children of an epileptic are specially liable to nervous or other affections?*

A.—Heredity is undoubtedly an important factor in the aetiology of epilepsy. Some studies have shown that as many as 10% of children with an epileptic parent are similarly affected. It seems likely, however, that this high figure is true only for institutional and severe cases, in which the hereditary component is strongest. Samples drawn from the general population, and thus including milder instances, give a lower figure—perhaps not much more than 2½%. Nevertheless this last figure is about five times greater than the general incidence of the condition. It is difficult, in the light of present knowledge, to be at all sure whether epilepsy should be regarded as one thing or many, speaking genetically. There is evidence that traumatic epilepsy is more likely to develop in those with a hereditary predisposition. The electroencephalographic studies of Lennox and Gibbs indicate that about 5% of the population show abnormal brain waves: it is suggested that the underlying condition behaves as a Mendelian dominant; it has also been found that identical twins always resemble each other in the presence or absence of abnormal rhythm and also in its type. Of the 5% who are predisposed, however, only about 1 in 20 ever has fits. Whether predisposition results in the manifest condition is presumably determined, or largely determined, by environmental influences. Thus, although the brain waves of identical twins are always alike, such twins not infrequently differ as regards actual epilepsy. It has also been observed that fraternal twins are considerably more alike in this respect than are brothers and sisters born at different times; presumably this points to the importance of prenatal or natal influences. Further research will be required before it becomes possible to elucidate the inheritance of epilepsy more precisely and also to calculate reasonably accurate chances in individual instances.

It would not appear that epilepsy is often genetically associated with other neurological and mental abnormalities, though some writers have claimed a connexion with migraine. The epilepsy which is so common in low-grade mental defectives is a special case; this is something different in its causation from the epilepsy occurring in those of normal mentality, and epileptic mental defectives do not appear to have any excess of epileptic relatives.

Water-Pitressin Test in Epilepsy

Q.—*May I have full details of the water-pitressin test used as an aid to diagnosis in doubtful cases of epilepsy?*

A.—The patient is confined to bed throughout the test. He is given an enema, is asked to pass urine, and is then weighed. He is fed on an ordinary diet with copious fluids. The intake and output of fluid are measured and are charted daily, and the patient is weighed morning and evening. An increase of 2% in the body weight with an excess of intake over output is taken as proof that a positive water balance has been established. This point is usually reached in 48 hours. Pitressin 0.25 ml. is then given intramuscularly, and 300 ml. of water by mouth. Further doses of pitressin (0.5 ml.) are given with 300 ml. of water every two hours to a total of ten injections unless a fit occurs before, when the test is stopped. Positive results have been claimed in from 40 to 80% of suspected epileptics, and there appears to be no risk of causing a fit in a person who is not an epileptic. Pitressin should not be administered to patients suffering from diabetes mellitus, nephritis, arteriosclerosis, or myocarditis.

Cl. Welchii and Gas Embolism

Q.—(*a*) *What is the chemical nature of the gas produced in man by the gas-gangrene organisms (Clostridium welchii, etc.)? (b) Could the equivalent of "air embolism" be produced by this gas and lead to death from acute heart failure? I have in mind a case in which a clostridial infection followed a septic abortion, and death took place comparatively rapidly, with collapse, low blood pressure, and intense dyspnoea, clinically resembling pulmonary embolus. On opening the innominate veins at necropsy large bubbles of gas escaped.*

A.—(*a*) Hydrogen and carbon dioxide in the proportion of about three parts to one. (*b*) No. Gas is found in considerable quantity only in tissues rich in fermentable carbohydrate—that is, muscle and liver. It is true that a small amount would be formed from blood sugar, and the accumulation of this after death might account for the appearance observed, but it could not conceivably accumulate during life in such volume as to cause fatal gas embolism. If embolism did occur in this case, is it not much more likely to have been due to the detachment of a thrombus?

Absorption of Dead Foetus

Q.—*Can a dead foetus in utero (missed abortion) become absorbed and disappear with little external loss? Can such absorption be associated with toxic effects such as headaches, nausea, fainting, and leucocytosis?*

A.—If the dead foetus is small, as in the first trimester, it is often absorbed and not found when the products of conception are expelled or removed. This is the case, for instance, in carneous moles. If by "foetus" the questioner means *all* the products of conception, the answer is still "yes." Even at term a placenta may be absorbed *in utero*, as has happened where a placenta accreta has been left *in situ* and a subsequent pregnancy has occurred. The absorption of a missed abortion may be accompanied by the signs and symptoms mentioned.

Persistent Sciatic Pain

Q.—*A patient developed acute meningitis following cinchocaine hydrochloride injection, and this responded to treatment with sulphonamides. A month after his discharge from hospital he was readmitted because of left sciatic pain. This was increased by coughing, but there was no low back pain. The patient had a leucocytosis, but was afebrile, and there were neither motor nor sensory signs. Penicillin, 130,000 units in eight intrathecal injections, brought the white count to normal but had only a transitory effect on the pains. Is this a case of nerve-root compression due to inflammatory fibrosis? What treatment would you suggest, what investigation, and what is the prognosis?*

A.—This is a problem case on which it would be impossible to give a dogmatic opinion without first making a full examination of the patient. There appear to be three possibilities. The first is that the sciatic pain is due to irritative neuritis resulting from the intrathecal infection; but if this was the case it might be expected that the symptoms would be bilateral rather than unilateral. The second possibility is that the condition is one of root pressure caused by a prolapsed intervertebral disk. Injury to a disk in the course of a difficult or ill-performed lumbar puncture might predispose to later prolapse. The third possibility is that the symptoms are due to some quite independent condition, such as spinal or pelvic neoplasm or sacro-iliac disease.

Before deciding on the best form of treatment it will be necessary to establish the diagnosis with greater certainty. It should be easy enough to dispose of the third possibility—the least likely one—after careful investigations, which should include pelvic examination; radiography of the hip-joints, sacro-iliac joints, and lumbar spine; cerebrospinal-fluid analysis, with particular reference to the protein level and bacteriology; and determination of the erythrocyte sedimentation rate. Assuming that extraneous conditions are thus excluded, it will then be necessary to decide between prolapsed intervertebral disk and irritative neuritis. The degree of the leucocytosis at the time of readmission is not stated; but unless the white-cell count was significantly raised it need not necessarily be regarded as an indication of reinfection, particularly as there was no pyrexia. Because of the unilateral nature of the pain and of the history of repeated lumbar puncture, disk prolapse is the more likely possibility; and if examination of the cerebrospinal fluid reveals no significant abnormality such a diagnosis should be made provisionally and conservative treatment instituted. Incidentally, treatment on very similar lines would be appropriate for a case of irritative neuritis. This should consist of: (1) application of a well-moulded plaster jacket from pubis to mid-thoracic level, applied with the patient standing; (2) rest in bed in the jacket for three to four weeks; (3) if improvement is occurring, ambulation and limited activity in the plaster is then permitted for a further six to eight weeks before removal of the jacket; (4) subsequently, if necessary, the patient may be fitted with a lumbo-sacral belt of strong design, to be worn for six months or more according to the clinical indications. Treatment on these lines has been shown to give excellent results even in severe cases of prolapsed intervertebral disk; and, particularly in a case such as this, it would be wise to continue with conservative measures for a considerable period before considering any form of operative treatment.

NOTES AND COMMENTS

Threatened Abortion.—Mr. L. W. HEFFERMAN (Swansea) writes: In an answer given in "Any Questions?" (Jan. 22, p. 163) I notice that the final opinion appears to be to discontinue the use of progesterone for threatened abortion. The following case may therefore be worthy of record. The patient was a woman, now aged 30, who in 1940, as a primigravida, had a miscarriage at six months. Just prior to this occurrence she was in an air-raid shelter at the back of the house while there was some bombing. She became pregnant again in 1941, and, having decided to get away from the bombing area, she went to the outskirts of the town. She again had a miscarriage at six months, and on this occasion, in addition to being in a safe area, there was neither air-raid warning nor bombs. In 1942 she was pregnant for the third time and decided to seek medical advice. We put her on progesterone, and she duly gave birth to a full-time baby girl weighing 7 lb. 2 oz. (3.2 kg.). In 1944 she had a miscarriage at two months. In 1945 she again became pregnant and again sought medical advice. She was put on progesterone once more and again had a baby girl weighing 8 lb. 12 oz. (4 kg.). She is pregnant again (expected date of confinement May 16), and we are treating her with progesterone. She sought medical advice because she had had a slight loss. At the moment the foetus appears to be very vigorous.

In addition to this case I have personal records of twelve other cases, all of whom as primigravidae lost their first pregnancies. All the twelve subsequently in their second pregnancies were treated with progesterone. Eleven had full-time normal infants, but one had a miscarriage for the second time in spite of progesterone. I have not seen her since, and in this case the Rh factor may be to blame. I notice that vitamin E was recommended, but I look upon this as more useful from a fertility point of view rather than for keeping the foetus *in situ* after the pregnancy has occurred.

Correction.—In the paper "'Paludrine' (Proguanil) in Prophylaxis and Treatment of Malarial Infections Caused by a West African Strain of *P. falciparum*," by Sir Gordon Covell and others (Jan. 15, p. 88), a mistake occurred in describing under "Prophylactic Trials" how the patients were infected with malaria. The sentence should read: "The patients were infected once weekly over a period of six weeks, each subject under prophylaxis alternately being bitten by five to ten heavily infected mosquitoes one week and receiving the next week intravenous injection of a suspension of the salivary glands of one heavily infected mosquito by the technique described by Shute (1937)."

All communications with regard to editorial business should be addressed to THE EDITOR, BRITISH MEDICAL JOURNAL, B.M.A. HOUSE, TAVISTOCK SQUARE, LONDON, W.C.1. TELEPHONE: EUSTON 2111. TELEGRAMS: *Aitiology, Westcent, London.* ORIGINAL ARTICLES AND LETTERS forwarded for publication are understood to be offered to the *British Medical Journal* alone unless the contrary be stated.

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